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OPA Turns Down Crude Hike

Brown, in Letter to Ickes, Proposes Instead Government Financing Of Wildcats—with U. S. Getting One-Fourth Override on Producers

NPN News Bureau

WASHINGTON—Government financing of wildcats is OPA's alternative proposal, in lieu of a general advance in crude oil prices, to encourage the search for new oil reserves. Government would get a quarter overriding interest in any commercial producing wells brought in with funds it advanced.

This attitude was made known in a letter from Price Administrator Brown to PAW Ickes which the petroleum administrator said he had received from OPA on May 3. In this letter, OPA turned down PAW Ickes' recommendation for a crude advance averaging 35c over the country, although expressing willingness to grant specific relief to stripper wells and re-pressuring operations.

OPA's determination was summed up by Mr. Brown as follows:

"1. That the general average increase of crude oil price ceilings as proposed should not be granted.

"2. That specific relief may be given to producers where stripper or re-pressure operations make present production unprofitable.

"3. That increased incentives may be extended to promote exploration for oil.

"4. That full development of proven properties should be insured through other necessary action under existing powers."

Blames Other Factors

Other factors than price were cited by OPA as affecting exploratory drilling, including manpower, spacing restrictions, proration restrictions, materials and transportation difficulties.

On point number 4, OPA was apparently referring to restrictions on use of materials to extend proven areas.

Crude advance recommended by Mr. Ickes, according to OPA, would increase prices by $500,000,000 based on present production. On the other hand, OPA held drilling of 4500 wildcat wells would cost the government only $150,000,000 even at an average of $50,000 per well.

OPA's Suggestion Outlined

Here is OPA's suggestion for financing these wildcats at "nominal" cost, if not self-sustaining:

"The government, under the plan, would furnish capital through existing banking facilities to operators for wildcat operations. In return for such an investment the government would receive a ¼ override interest in any well proving to be a commercial producer; if the well proved to be a dry hole the override interest would be worthless and any obligation in connection with funds so advanced discharged. In the case of a producing well, the operator would have the option of permitting the ¼ override to stand or of liquidating such interest on the basis of $7.00 for every $1.00 advanced. The advance through such a plan would be limited to a maximum of 2/3 of the estimated actual cost of drilling the well subject to revision upwards or downwards when final figures were available. The balance of the cost would be handled by the operator through the sale of acreage, bottom or dry hole money and/or personal assets. Under the plan, duly qualified operators could and would undertake wildcat drilling to any degree deemed necessary or advisable and in contrast to a general price increase, all funds made available would be used directly in exploring for new reserves. In case the well proved to be a producer and additional funds were required for completion, these would be available on a dollar-for-dollar repayment basis. While some administration would be necessary, it is not contemplated that it would be more involved than that customarily present in comparable business transactions.

"The original idea for this plan was advanced by an oil producer and we have received favorable reactions in discussing it with both large and small operators. It in no way provides for government participation in the management or ownership of the oil industry."

Secondary recovery projects which are uneconomic at present prices could be financed by a variation of the above-described plan, OPA said.

A general price increase to prevent premature abandonment of stripper wells is not justified because, OPA said, only about 3% of stripper wells were abandoned last year at current prices. However, OPA expressed willingness to consider price increase application on an individual hardship basis.

PAW Ban Hits Midwest To East Shipments of Heating Oil

WASHINGTON—Effective May 3, a temporary ban on practically all tank car shipments of heating oil from the Mid-West to East Coast points was invoked, PAW announced on that day. Telegrams to this effect were sent out to 45 fuel oil suppliers.

The ban—to facilitate oil transportation and storage for the armed forces—applies only to fuel oil brought to the East Coast by tank car from midwestern refineries for space heating purposes. It does not include heating oil shipments originating at terminals on the Ohio and Mississippi rivers, where heating oil is received by barge from the Southwest and completes its journey to the Eastern Seaboard via tank car.

While tank car shipments have been temporarily halted to most east coast points, Deputy PAW Davies pointed out that a certain number of cars will continue to carry fuel oil from southwestern refineries to New England.

Mr. Davies said that this temporary ban does not apply to distillates used for tractor fuel, diesel power, gas enrichment or other similar purposes which do not involve space heating.

Rubber Bounces

Jeffers, at Truman Hearing, Defends Bull - by - Horns Methods. Evidences Dislike for Kiss-and-Make-Up. Pushing Rubber Aided Others, He Says

NPN News Bureau

WASHINGTON—Rubber Director Jeffers, defensive and at times belligerent in his answers, gave the Truman investigating committee May 4 a restrained okay to the rubber-100 octane truce revealed May 3 by War Undersecretary Patterson.

Mr. Jeffers' attitude toward the get-together contrasted sharply with the "Jeff and I" relationship portrayed before the committee by his competitor for component parts (*see story p. 16*).

The rubber director told the committee he planned to consult with Mr. Patterson, Navy Undersecretary Forrestal, and PAW Ickes to iron out conflicts in military and rubber programs.

Asked why that course was not adopted in the past, he snapped "I don't know" at Sen. Ferguson, Mich.

Sen. Ferguson remarked that "competent direction would have been helpful all the way through", and Chairman Truman commented, " . . . I think that is the answer to the whole problem."

'Perhaps too Well'?

Mr. Jeffers said the only accusation made against the rubber program is that "my associates and I have done our job well—perhaps too well. It is the first official commendation I have had since I have been in Washington."

"Ths testimony has brought out that the forced progress of the synthetic rubber campaign has not delayed the manufacture of 100-octane gasoline or escort vessels or aircraft or merchant marine. Rather, the momentum of the rubber program has dragged forward all of these phases of the war.

"Bottlenecks which we encountered were broken, to the joint advantage of all programs. We found sources of supply that had never been considered."

Mr. Jeffers reiterated previous statements that the Baruch report was his "bible" and pointed out that the report recommended that

(*Continued on p. 7*)

CHICAGO OIL ROUNDUP

:: *News and Gossip in the Mid-West* ::

By EARL LAMM, NPN Staff Writer

CHICAGO — Trend here is toward greatly increased sales of Ethyl gasoline compared with a year ago, an informal survey by NPN of several mid-western marketers and refiners shows. One large refiner reports an increase of 200% in Ethyl sales over last year, although his percentage of Ethyl sales to total sales is still below the average percentage of all companies interviewed.

All other grades were reported on the decline, percentage-wise, with 63-66 octane—third grade leaded—either out or going out of the picture. Principal reason given for the change is that rationing has made motorists ultra mileage conscious, with the feeling that anti-knock fuel is best for the year older car. The survey showed total gasoline sales of the companies averaged out among the various grades as follows: Ethyl, 28%; house brand, 64%; 63-66 oct., 2%; 60 oct. and below, 6%. In some cases the individual company figures given were estimates.

In some sections, Ethyl sales were said to almost equal to those of house brand, and one refiner figured his Ethyl sales were 60% of his total. With other companies, Ethyl sales were only 16% to 17% of total gasoline sales. House brand sales varied from 35% to 80%; 63-66 oct. from nothing to 8%; and 60 oct. and below from nothing to 15%.

Tractors Take Higher Grade

Trend is toward higher grade power fuel for farm tractors and away from the heavier distillates. Socony-Vacuum has had a power fuel for some time, Standard of Indiana announced its new product in March, and Ohio Oil has just brought out one. At least one other large refiner is considering it, with an announcement expected soon.

Reduction in the number of products to be turned out by mid-western refiners is said to be in the mill as this would greatly facilitate handling under the new zoning regulations. Somewhat less transportation would be required, considerably less storage would be necessary to keep the different products separated, and operation of product pipelines would be simplified.

Some refiners recently reported discontinuance of 60 oct. and below gasoline, but rumor has it that this is one of the items that will be kept on the product list, particularly in order to meet rural and farm trade demands.

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Great Lakes are open to tanker navigation as far north as Holland, Mich., and Green Bay, Wisc., deliveries of products having been made to those points. A tanker was reported to have reached Buffalo April 28, but later reports indicated it had struck an ice jam, which high winds caused to close in on the boat just before it reached port. Boats were scheduled to start through the upper straits for Superior, Wisc., on May 3.

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Producers, refiners and supply companies in District 2 are being urged to forecast materials needs. Loyal B. Holland, District 2 PAW director of materials, has suggested in letters to producers that they prepare lists of required materials for the fourth quarter of 1943, which lists are to be filed with PAW before June 1. New application for materials forms will be mailed out by PAW for use before time for actual filing of the lists, however.

In another letter to refinery operators, Mr. Holland warned of the freezing of order books of 3 steel valve manufacturers for the month of May, "indicative of the present trend, which will quite likely mean completely frozen schedules of all manufacturers of steel valves in the near future."

Minimum delivery of valves now is 4 to 5 months, with average of 6 months. Extreme cases will take 11 months. The shipbuilding division of WPB, Mr. Holland wrote, advises that there are about 30,000 tons of valves, required in 1943, which are not yet even on order. Operators who need valves should order them immediately.

Supply companies in District 2 were advised by Mr. Holland to file PD-IX applications with WPB covering all engine orders now on file with engine manufacturers where rating is AA-2X or lower, as such orders are likely to remain unfilled indefinitely. WPB's granting of AA-1 ratings is anticipated, according to Mr. Holland's letter, which would make possible up-rating of present orders, followed by early delivery.

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Small independent producers in District 2 are hopeful that the pending amendment to P-98-b, expected momentarily, will enable them to buy casing and other tubular goods on short notice to meet unexpected needs where such relatively small amounts of materials were not included in advance quarterly lists under the Controlled Materials Plan, such as is required of operators who drilled 40,000 ft. of hole or more in 1942.

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Secondhand steel storage tank dealers and OPA are trying to arrive at basis for fixing ceiling prices. At a regional OPA meeting with Mid-West dealers at the Palmer House on April 30, anybody but an oil man accustomed to spectacular booms would have been startled by the war-rocketed prices being paid for old 55,000 bbl. storage tanks that 10 years ago stood empty and useless all over Oklahoma and the southwest oil territory. They were practically given away to anyone who would cut them down and haul them off.

According to the dealers, 1933 prices ranged from $500 to $600 each—sometimes less. By 1936 the price had jumped to $1500, and 4 years later went to $5000 to $6000. That was in 1940, and by 1941, the price had more than doubled again—had boomed to $12,000 to $15,000 each, where it still is, with more buyers than sellers.

About 90% of all such tanks dismantled prior to 1936, it was said, were old tanks used for storage of sour crude with deleterious results, especially to roof and structural supports.

Some questions argued at the OPA-dealer meeting were:

1—Should the ceiling price be fixed at $45 per ton or $55?

2—Should the weight be actual or theoretical?

3—Who pays for the rivets?

4—When is a re-used, field-erected tank sale a sale, anyhow?

5—Who pays (under any promised ceiling price) for cleaning, dismantling, hauling and re-erecting? And then for going back and repairing roads, or paying for crop damage incident to removal of the tank? These things may vary greatly depending upon size, style, distance and location.

One operator argued that $45 per ton was too low—that the major companies wouldn't sell at that price and dealer business would suffer. Another said that $55 was too high and the dealer would be stuck on re-sale. Also, tanks, like well casing and line pipe, are tagged with a manufacturer's average weight, which does not always test out on the scales. A 5% tolerance is usually allowed on new material; that is, 60,000 lbs. of pipe at catalog weight may actually be 3000 lbs. short on the scales, the dealers said. Also, rust and corrosion from long standing affect the weight. Should it affect the ceiling price?

And, for example, who pays for the 10 tons of rivets in an 80,000 bbl. tank, which rivets are lost when the tank is torn down? Maybe, too, the holes are sheared off (more weight lost) if the salvaged material is reduced to steel plate or used for building smaller tanks.

A used tank sale is a sale when title passes, the OPA attorney present said, and that depends on individual cases. When the contract is signed between 2 responsible parties, when the tank is cut down and hauled off, or when the money is paid. Suggestion from a dealer that some other dealer present might show up later with a big contract dated just prior to the date ceiling prices were fixed brought a laugh.

Cleaning at $2 a ton and dismantling at $13 a ton some thought too high and others too low in addition to the base price of $45 per ton for the metal. Final decision will come from Washington after all OPA regional offices report.

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Carroll W. Johnson, PAW District 2 marketing director, has sent in his resignation. He has some private business in California he hopes to get back to by June 1.

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PAW Directive 57, prohibiting tank car shipments in District 2 without permit, is coming up for cancellation as it has been supplanted by the more detailed Directive 65, zoning supply and distribution and also prohibiting tank car shipments without permit.

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There is some talk of applying PAW Directive 65 (zoning) to shipments of certain grades of crude oil used directly as fuel oil without refining.

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Distributors and truck transport haulers

who have been making long trips from south and eastern Nebraska down into Kansas where independent refiners have been underselling the Group 3 market probably won't like PAW Directive 65 which more than likely will stop their operations. Such trips are said to be netting the truckers as much as 2c per gal. profit. Under the new zoning regulations distributors will be expected to buy from their nearest sources of supply, which are terminals in the Nebraska area with prices based on Group 3.

* * *

New zoning regulations in District 2 affect business all over the U. S., not just District 2. Companies with refineries in Kansas or Oklahoma and also in Texas (District 3), for example, are trying to work out trades and exchanges with other refiners with outlets in New England and south down the East Coast in District 1 in order to secure use of certain of their terminals in District 2.

Oil Heating Association Of National Scope To Be Chicago Goal

NPN News Bureau

CHICAGO—Formation of a strong, all-inclusive, national trade association to fight the industry's nationwide battles collectively was proposed in a joint invitation sent out April 30 by Burning Oil Distributors Assn., Chicago Oil Burner Assn., and Oil Heat Institute of America, for a regional meeting at the Blackstone Hotel here on May 14.

In assuming sponsorship of the meeting, the Burning Oil and Chicago associations said in the letter of invitation mailed to Mid-West distributors, dealers, individuals, groups and local associations that the meeting was called "in the firm belief that the experience during the current heating season of all individuals and groups throughout the Middlewest, with the OPA fuel oil rationing plan and with PAW conversion program, has pointed to a crying need for just such an organization as the Oil Heat Institute proposes.

"If the chaotic experiences through which we have all just passed are to be avoided in the future," the letter continues, "our representations to our government in connection with matters of vital importance to our industry and the public which it serves must have the weight and prestige of unification as evidenced by a strong national body representing all phases of the oil heating industry.

"Millions Depend on Oil"

"In this manner, and only in this manner, can our government at Washington be fully and convincingly apprised of the will of our industry. Failing in this, we are negligent in our duty and responsibility to millions of citizens totally dependent upon oil for fuel."

War sacrifices are admittedly necessary, the oil and burner distributors agree, but they assert: "While our sacrifices have been practically bordering upon self-destruction, powerful and exceedingly well organized competitive interests have been attempting to write the obituary for oil heat throughout the national press. Our lack of a unified approach to our problems has made it impossible for us to combat this vicious propaganda."

B.O.D.A. members have called to the association's attention recent widespread direct mail advertising campaigns of big insulation manufacturers and others urging the public with oil heating installations to convert to coal and insulate homes in accordance with Office of War Information's radio program urging the same thing. B.O.D.A. contends the home conversion program by OPA and PAW has been stopped and has wired Elmer Davis of OWI suggesting that he revise his radio program, now scheduled to continue through May. The insulation part of the program is admittedly a good thing whether oil or coal is used for heating.

Indiana Association Takes Census Of Gasoline Station Workers

Special to NPN

INDIANAPOLIS—Manpower questionnaire was sent to marketers in this state on April 28, by Indiana Independent Petroleum Assn. to ascertain the number of regular men, girls, and part-time pump boys employed during 1942 and 1943. Number of men under 18 and over 38, number of men between those ages and the number of girls employed by each operator at present is also asked for. To show the labor turnover and cost, columns are provided for the number of former employes now in the armed forces and the number gone to other industries, also the labor cost per gallon sold in 1942 and to date in 1943.

Phil T. Williams, I.I.P.A. president, explained in a letter accompanying the questionnaire that there was now little hope that the marketing branch of the industry would be classified as essential, and that the job of marketers now was to prevent pirating of the balance of their labor. Statistics developed by the questionnaire, he believes, will show 2 things:

1—That number of employes is at irreducible minimum.

2—That practically all competent men have already left for military service or other industry, and the few remaining between 18 and 38 years of age have 2 to 4 children.

"I believe your figures will show 60% to 70% of your employes are over 38 or under 18, or are women," Mr. Williams said.

With the better breakdown of figures, the Indiana association expects to show the State Employment Service that the industry has been stripped to the irreducible minimum, and that if they want the distribution system to function for industry and agriculture, it cannot continually be robbed of necessary employes.

'Gas' Shortage Hits Farming In Northern New Jersey

Special to NPN

TRENTON, N. J.—At least one-third of the farmers of northern New Jersey are being held up in their normal spring plowing and planting because of a gasoline shortage in the area, Joseph L. McLaughlin, New Jersey state petroleum coordinator, reports. Similar situations are believed to exist in Connecticut, Massachusetts and in the Philadelphia area. Despite seriousness of the problem, no concrete remedial steps have been announced publicly. According to Mr. McLaughlin, the matter depends on PAW's ability to strike a balance between essential civilian and military requirements. He suggested the remedy might be to require the military to estimate its needs 2 to 3 weeks in advance.

Cuts Red Tape for Farmers

Special to NPN

STARKWEATHER, N. D.—What amounts to a filing and bookkeeping service to farmers who dislike being bothered with papers and office records is offered by Starkweather Oil Co. here which proposes, in a letter to its farm customers, to "reduce the inconvenience of red tape" now surrounding the sale of gasoline.

The company offers to take "the burden of keeping the coupons, white slips and licenses", thus relieving the farmer of the task of saving papers required for his gasoline tax exemption, keeping them handy at all times and filing them with state authorities at the end of the season.

Now, upon delivery of a load, the farmer merely signs the exempt certificate (North Dakota gasoline tax exemption to farmers), and pays for the goods.

The "red tape" is the state requirement of a license permit to buy tax-free gasoline for farm use, presentation of it by the farmer to the jobber when buying, entry on it by the jobber of each purchase, farmer's signature to tax-exempt receipt, then the saving and filing at the end of the season the license and exempt receipt with state authorities with application for next year's license.

DEATHS

William J. O'Malley

William J. O'Malley, PAW's industrial fuel oils chief, who had been working principally on colloidal fuels, died in Washington following a heart attack May 3. He was formerly Cities Service Division manager at New York. He leaves a widow and five grown children.

John McFadyen

John McFadyen, 72, for 47 years an employe of the Ohio Oil Co., died April 26 at his home in Beverly Hills, Calif., following a heart attack.

From 1894 until 1912, when he was transferred to Wyoming as superintendent of Ohio Oil's operations in the Salt Creek field, Mr. McFadyen served the company in Ohio. In 1925 he was elected director and vice-president. He was also vice-president of the Mountain Fuel Supply Co. and president and director of the Rocky Mountain Gas Co. He retired from active duty in 1941.

R. B. Kirchhoffer

R. B. "Berry" Kirchhoffer, assistant district sales manager for Standard Oil Co. of California in Los Angeles, died April 21 at Good Samaritan Hospital. Born in Ontario, Calif., March 28, 1896, raised and educated in Los Angeles, Mr. Kirchhoffer spent the last 24 years in the marketing end of the oil business with California Standard.

An Ensign in the United States Navy in World War I, he entered the oil business in June 1919 as a service station salesman in Los Angeles.

NPN Reports

War Oil News and War Orders from

WASHINGTON

For ALL branches of the Oil Industry

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Deferments are Harder to Get

Selective Service Tightens Rules as Draft Boards Near End of Supply of Childless Men. Even War Workers are Taken. How Oil is Affected

NPN Staff Special

WASHINGTON—Selective Service is getting tougher on occupational deferments and is tightening up its appeals procedure as local boards scrape to meet quotas without calling married men with children. Selective Service headquarters has fenced off fathers until further notice.

Local boards are now drawing on childless married men (children born since Sept. 15, 1942 don't count) and men with collateral dependents. Supply of single men, except those deferred, has been exhausted in virtually all boards.

When these lists have been exhausted by all boards (after adjustments between boards on quotas), Selective Service headquarters will give the signal for letting down the bars on fathers. Officials won't say when this will come. Indications are that it may not be until early fall. Again, it might come in July or August, depending on military requirements.

Manpower Supply Analyzed

Reason for Selective Service's "toughening up" is evident from this calculation:

Take the total number of men between 18 and 38, in uniform and out—22,000,000. Deduct 3,500,000 farmers entitled to deferment. That leaves 17,500,000. Out of that number the armed forces want enough to have 11,000,000 in uniform by the end of the year. Consider that rejections are running around 42% of all those called up. That brings the available supply of those fit for service down close to the 11,000,000 needed in the armed forces. It leaves scant margin for deferments, even in war plants.

Until recently, any man with dependents, working in a war plant or an industry essential to the war effort, was entitled to a 3-B classification, even though he was a male stenographer. He didn't have to be a "key man" to get a 3-B. But Selective Service has abolished the 3-B classification. All married men with children in 3-B were reclassified 3-A. All other 3-Bs were put in 1-A, if they didn't qualify as "irreplaceable" or "key" men in an industry essential to the war effort (2-A) or in a war plant (2-B) or were not farmers (2-C).

Draw on War Workers

Automatically, that removed the occupational deferment from war workers unless they were "irreplaceable". So, local draft boards are now drawing on war workers (except the fathers in 3-A) whose jobs can be filled by women or men not fit for military service. A replaceable man in a war plant is no more draft proof now than a man employed in an industry not specifically classed as war essential, such as oil distribution.

This has lessened the attraction of war plant work for fathers. In the time remaining before the bars are let down, it is unlikely that they could qualify themselves as "irreplaceable" or "key" men in a war plant, should they change jobs now.

Oil distribution has not been formally declared as "essential" to the war effort, although PAW Ickes and War Manpower Chief McNutt in a joint press statement did declare that *all* branches of the oil industry were essential. For production, natural gasoline, refining and transportation, Selective Service has issued a critical list of occupations for *guidance* of local boards. It is left to the local board's discretion. Other activities which the board regarded as essential could be grounds for deferment. Thus, a board could defer an experienced employe of an oil distributor whose job could be taken over by a woman or aged or physically handicapped man, if it felt that his work was "essential". (There are a few occupations classed as "non-deferrable" under any circumstances but none is in oil distribution.)

Tightens Appeals Procedure

Selective Service headquarters has instructed its state directors to hold down the number of appeals coming to Washington, settling as many as possible at the state level. If an appeal by the registrant or his employer for occupational deferment gets even one affirmative vote from the appeals board, it can be carried to Washington as an "appeal to the President". Selective Service headquarters examines all such appeals, deciding whether or not they should go to the presidential appeals board. And they are getting tougher and tougher.

Employers taking an appeal from an appeals board's decision must act promptly because the case must be presented, examined and docketed at Washington within the 10 days allowed the registrant after his appeal is denied. There is no provision for postponing induction pending a decision on whether or not the "presidential appeal" should be docketed.

Formerly, Selective Service was more liberal on "presidential appeals" but they became so numerous that docketing of the appeal was equivalent to an automatic 90-day deferment (it took that long to be acted upon in its turn).

OPA 'Gas' Rationing Panel Holds First Meeting

WASHINGTON—OPA's newly-formed advisory panel of major eastern oil company executives and representatives of retailer organizations met here for the first time April 29 to discuss problems arising from East Coast gasoline rationing.

After reviewing experience of past year, members of the panel took up present status of gasoline rationing in District 1 and suggestions for improvements in coupon system. (*See "Washington Outlook", p. 8*).

Oil men attending were:

S. B. Eckert, Philadelphia, Sun; J. E. Skehan, New York, New Jersey Standard; H. M. Figgatt, Wilmington, Del., Diamond Coal & Ice Co.; C. F. Hatmaker, New York, American Oil Co.; P. E. Lakin, New York, Shell; Walter Faust, New York, Socony-Vacuum; R. L. Alexander, New York, Sinclair; W. V. Hartmann, Pittsburgh, Gulf; J. A. Corey, Philadelphia, Atlantic; Ray M. Parker, New York, Hartol; Charles S. Jenney, Boston, Jenney Mfg. Co.; J. E. Fenn, Miami, Orange State Oil Co.; Wiley Moore, Atlanta, Wofford Oil Co.; Russell Keck, Bradford, Pa., Kendall Refg. Co.; John Harper, New York, Empire State Petroleum Assn., Inc.; John Dressler, president, Hackensack, N. J., Eastern States Gasoline Dealers Conference; Harry Wainwright, secretary, Gasoline Retailers of Washington, D. C.; Fred Moore, Boston, Board of Directors, Eastern States Gasoline Conference.

To Drop No More 'Quickies'

NPN News Bureau

WASHINGTON—Deputy Rubber Director Dewey told NPN April 28 that no more cancellations of "quickie" rubber projects are contemplated at this time. If any plants get far behind, however, he said, they might have to be dropped. Future cancellations, he added, also depend on changes in allocations that WPB may make.

RUBBER BOUNCES

(*Continued from p. 3*)

the rubber director resurvey the situation from time to time in the light of existing conditions.

"We have done that from month to month," Mr. Jeffers said, "and from day to day, and have reduced the amount to be produced by cancelling out plants with rated capacity of 224,000 long tons. I am very definitely of the opinion that it would be a tragic error to further reduce the amount of rubber to be produced."

Next 4 Months Critical

The next 4 months of the rubber program, he said, are the most critical.

"We have demonstrated that we can build the plants," Mr. Jeffers asserted. "The making of synthetic rubber from an alcohol base as well as from petroleum base has likewise been demonstrated, as synthetic rubber is today being produced from both of these processes.

"But I cannot determine in advance the troubles to come from yet unproven processes. Neither can I determine in advance that there may not be explosions, fires, breakdown of equipment or machinery, labor difficulties, any of which could tie up a plant for months and again reduce our position to one of danger.

"Even after the synthetic processes are developed and confirmed, there is still the problem of developing organizations to produce the rubber in satisfactory amounts and in satisfactory qualities. There is the added problem of taking this new process and compounding and fabricating the materials into tires and other uses."

Lowers Stockpile Minimum

Mr. Jeffers revealed that he had lowered the critical stockpile minimum of rubber to 100,000 tons. He has also cut the amount actually to be milled this year from 612,000 tons—estimated in his second progress report of Feb. 18, 1943—to 609,000 tons.

Mr. Jeffers expects to make 275,000 tons of synthetic rubber this year and that reserves at the end of 1943 will be 145,000 tons—45,000 above the 100,000 stockpile danger line.

"We have made available an appreciable number of recaps and new tires for distribution by rationing boards," Mr. Jeffers told the committee. "We did this because we felt that there were restrictions without warrant in the early rationing rules and that essential uses were having unwarranted difficulty in obtaining tires and recaps necessary to the war effort."

ODT and OPA To Recall Excess 'T' Coupons

WASHINGTON—ODT and OPA on May 3 moved against a potential source of black market gasoline by arranging for prompt recall of the excess "T" coupons of operators whose allotted mileage has been cut. Action was taken in Amendment 46 to RO 5C, effective May 2.

Specifically, here is what the new procedure provides:

1—Any gasoline coupons representing gallonage in excess of the certificates of war necessity holder's revised needs will expire at the time a revised certificate is issued.

2—Likewise any "T" ration coupons issued on basis of a certificate of war necessity will expire upon the revocation of that certificate by ODT.

3—Surrender of these void excess coupons will in most cases be demanded by ODT, which will destroy them after giving the ration holder a receipt.

4—Or, upon certification from ODT that a ration holder whose certificate has been modified holds excess coupons, OPA may require surrender of these excess coupons.

The provisions, OPA estimated, should expedite the withdrawal from the field of any "T" coupons that might be made use of in illegal gasoline transactions.

Quota of New Passenger Tires Reduced by OPA for May

WASHINGTON—The quota for new passenger car tires for rationing in May is 1,006,882, OPA announced April 28, compared with 1,058,000 for April. Certificates for purchase of these tires go to drivers whose mileage rations exceed 240 miles monthly and who do not have recappable casings.

The April new tire quota was made up of 506,000 Grade I tires and 552,000 Grade II's, but these grade distinctions are being dropped May 1 and all tires in both grades then will be designated Grade I, OPA pointed out.

Other tire quotas were announced, as follows:

	May	April
Used and recapped casings	600,799	598,000
Truck tires	414,108	368,000
Passenger car tubes	735,781	736,000
Truck tubes	434,355	338,100

No quota for truck tire recapping has been assigned, OPA said, since restrictions on number of recapping certificates that may be issued will be removed May 1.

Eastern Rural Road Traffic Off 48% in March—PRA

WASHINGTON—Traffic on rural roads in March in District 1 dropped 48% and in the rest of the country about 37% from its prewar normal of the corresponding month in 1941, Public Roads Administration reported May 4.

Traffic in February, PRA said, was off 52% in the east and 35% elsewhere, compared with same month in 1941.

Dodge Named District 1 Chief

WASHINGTON — Will Dodge, Texaco Marketing vice-president, was sworn in Saturday, May 1, as PAW director-in-charge for District 1.

RATIONING CALENDAR

Fuel Oil

Period 5 coupons are valid in all zones. In the 17 Eastern States and the District of Columbia, No. 5 coupons are worth 10 gallons for Class I users; 100 gallons for Class II users. In 13 Midwestern States Class I No. 5 coupons are worth 11 gallons; Class II are worth 110 gallons, except in Southern Indiana, Illinois, Kansas, Missouri, Ohio, and all of Kentucky where Class I coupons are worth 10 gallons and Class II 100 gallons. The value of coupons in Washington and Oregon remains at 10 gallons for Class I users; at 100 gallons for Class II users.

Zone A: Period 4 coupon expired April 17.

Zone B: Period 4 coupon expired April 12.

Zones C and D: Period 4 coupon expired April 6.

Householders are cautioned to preserve the identity stub of their heating ration as it will be required when next winter's rations are issued.

Gasoline

"B" and "C" coupons expire according to dates indicated on individual books.

A-5 coupons are good for three gallons in Eastern States and four gallons elsewhere. In the 17 Eastern States and the District of Columbia validity runs to July 21; in the rest of the country, validity runs to May 21. The extension of the valid period on the East Coast will have the effect of limiting motorists who have no occupational use for their cars to 90 miles a month. Car owners in the East will be eligible for supplemental rations for necessary driving to and from work or in connection with work. However, they must first form a car club to carry three or more persons to work regularly.

Farmers may obtain gasoline for their tractors, engines, and other nonhighway equipment for a period of six months.

Virtually all types of installation, maintenance, and repair service on essential nonportable goods are now eligible for "C" rations.

Tires

Owners of passenger cars and commercial vehicles using tires smaller than 7.50 x 20, may get their casings recapped with reclaimed rubber camelback without applying to their local War Price and Rationing Boards for certificates.

Drivers with gasoline rations for more than 240 miles monthly are eligible after May 1 for any grade of new tires when present casings are not recappable.

Certificates for tires and tubes may be used at any convenient time.

Farm tractor and implement tires will be recapped only with a material made almost entirely of reclaimed rubber, and replacements will not be issued for tires that are recappable. Tire dealers or persons selling or servicing farm equipment who need rear-wheel tractor tires to serve their customers will be able to get stocks for this purpose. Retail milk delivery vehicles are eligible for replacement tires when their present casings are not recappable.

Washington Outlook . . .

Background News and Opinion

By A. M. PETTY, NPN News Editor

OPA's gasoline rationing program is being overhauled—but it may wind up on the junk heap anyway.

Tip-off is Rubber Czar Jeffers' optimism over civilian tire prospects. Privately, he has been telling other government officials that gasoline rationing is no longer needed to save rubber. Efforts have been made to hush him up but he may burst forth with a statement soon.

Other government agencies don't agree with Mr. Jeffers. Some question whether there are enough tires to go around. Others wonder about gasoline supplies. Even if the rubber director is right, they feel that the change-over should be gradual. ("Administrative softening" is the phrase government officials use among themselves when necessary to start back-tracking—like the about-face on oil-to-coal conversions.) Under spur of Mr. Jeffers' optimism about tires, OPA already has liberalized gasoline rations for occupational driving outside the District 1 shortage area.

If there are plenty of tires, then gasoline consumption need be restricted only by supplies available (unless ODT decides to hold down mileage because of parts shortage or other reasons).

If gasoline consumption is restricted on a supply basis only the East Coast, Pacific Northwest and other areas dependent on rail transportation would probably still be "shortage areas". Scarcity of crude might be a limiting factor on gasoline consumption in the Mid-West, as well as transportation. Certainly, there would be little argument left for restricting consumption in the Southwest, in California or other areas where crude supply is ample. The Southeast might be lifted from the shortage area because of its pipeline and barge facilities.

Overhauling gasoline rationing was overdue. OPA officials admit that there is an over-issuance of coupons and that the "black market" is increasing in size. They don't know how much—because OPA has no record of coupon books issued. OPA can only "guess-estimate" totals based on a sampling. They rely solely on "eligibility" of ration applicants, which is determined by varying degrees by thousands of local boards. Overissuance of "T" coupons is principal source of the "black market", although easy-to-counterfeit coupons and thefts due to careless handling are factors, as OPA was told April 29 by its gasoline industry panel.

PAW Ickes has repeatedly criticized OPA for "coupon inflation" in the East. (Most recent time was April 28 before a congressional committee.) Much of PAW's troubles in supplying the East Coast has been due to loosely-controlled consumption, PAW officials feel. OPA has failed utterly to tailor demand to supplies available or even to keep records of coupons issued.

OPA feels this criticism, fears that PAW may "muscle in" with some kind of L-70 curtailment plan. Or at least specify how OPA shall ration in each area. That was evidenced by OPA's hasty impanelling of a gasoline marketing group to review rationing plan in the East. Oil men present felt a certain anxiety to please, a yearning for approval of OPA's rationing efforts.

OPA carefully polled the panel on coupon rationing. Favorable vote was nearly unanimous (one dealer thought there should be an L-70 to assure equitable distribution of supplies). Any comfort OPA may have obtained from this vote, however, was tinged with criticism from the panel that followed. Most members of the panel had some complaint about OPA's policies and methods.

PAW favors L-70 method, if supplies come within 33% of normal. That was their view originally; it still is. But most major companies were for the coupon plan. They still are, if the OPA panel vote is any indication. So, a battle looms if and when PAW tries to substitute delivery curtailment for coupons.

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Surcharge on small dumps is a relief measure for fuel oil marketers being considered by OPA. During past winter, fuel oil tank wagon deliveries of 25 gal. were common; some dumps were as little as 5 or 10 gal. under rationing allotments. OPA's fuel oil rationing branch hopes to eliminate most small dumps next winter with the summer fill-up and floating inventory. But there are bound to be some.

One group of distributors suggested a flat charge of $1 for each delivery of less than 125 gal. They point out that a gallonage compensation—even 1c per gal.—amounts to virtually nothing on a 10 gal. or 25 gal. dump. However, OPA is more likely to approve a gallonage surcharge—say 0.5c per gal. on deliveries of less than 100 gal.—because there is historical justification for such charges in many areas.

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Oil-to-coal conversions were further dampened by the coal strike. Even before the miners walked out, however, PAW Ickes had given in and agreed to stop urging domestic conversions. But it took some prodding from WPB Chairman Nelson.

It was a sad day for some people at OWI when Mr. Nelson's conversion policy committee unanimously put the kibosh on "all government propaganda by OWI, OPA, PAW, etc. urging conversion of residential installations" (to quote the committee's own words). The OWI radio campaigns bureau had worked up—with the help of PAW—some nice "plugs" for residential conversion. They had made recordings of these "messages" for radio stations to broadcast as spot announcements. Now, they'll have to break up those recordings or else violate Mr. Nelson's edict against such "propaganda". (Incidentally, that committee's use of the term "government propaganda" set a new high in frankness for Washington officialdom.)

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Maybe OPA will regret its hasty veto of a crude price increase when it hears the current estimates of military oil requirements. Oil men who have heard are still a little breathless over the increase in crude production that will be required to meet demand. But the figures should be strong support for an "appeal" from OPA's decision to Capitol Hill. They show some kind of stimulant is needed immediately to increase production and search for new fields.

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OPA's letter on crude prices was a sudden move in the White House strategy against John L. Lewis and his threatened coal strike.

OPA's staff was amassing a lot of data bearing on points in the Ickes recommendation for higher crude prices. Indications are that this survey work had not been completed—or at least totaled up, when the letter was sent.

One guess is that word came suddenly from Economic Stabilizer Byrnes at the White House that an OPA denial of the crude price plea was needed as trading material in negotiations with Mr. Lewis.

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PAW Ickes disclosed the turndown of his crude price increase recommendation at a press conference on the coal situation, held May 4. For more than 45 minutes Mr. Ickes was bombarded with questions exclusively on coal. As the newsmen were filing out, NPN's representative went up to Mr. Ickes and asked if it were true that OPA had turned him down.

"Come back here, everybody, please," Mr. Ickes called to the newsmen.

"I have been asked if I have heard from Mr. Brown on crude oil prices. The answer is 'yes', he didn't grant an increase."

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Justice Department attorney who now does the attorney general's "consulting" with PAW and WPB on anti-trust clearance is Ernest S. Meyers. Under Section 12, Public Statute 603, passed last year, WPB Chairman Nelson gives a "green light" to joint activities found necessary to the war effort. Mr. Nelson is required to consult with the attorney general before he issues the necessary certification.

Mr. Meyers is from New Rochelle, N. Y. There has been no oil in his 5-year background with the department's anti-trust division. He breaks the Harvard tradition, coming from Yale Law School (J. Howard Marshall's Alma

Mater). Graduating in 1934, he came to Washington in 1935. He served with several regulatory agencies—SEC, FCC and FPC—before going over to the anti-trust division in 1938. There, his activities were mostly cases involving electrical patents — incandescent, fluorescent, glass bulbs and tungsten—including international angles. His title now is Chief, War Programs Section, Department of Justice. He succeeds Moses Hubermann. He handles all applications for anti-trust clearance. On oil matters he consults with W. B. Watson Snyder, anti-trust division's oil expert.

West Pennsylvania Kept In Shortage Area By Declining Stocks

WASHINGTON — Western Pennsylvania is still in the shortage area and seems scheduled for a good long stay. PAW Chief Ickes on April 28 said a detailed study of the gasoline supply situation in the area showed that relaxing of gasoline restrictions could not be justified at present.

The reason it cannot be justified, Mr. Ickes said, is because gasoline stocks at refineries and terminals in western Pennsylvania dropped 248,481 bbls. between Feb. 28 and March 31.

PAW said Mr. Ickes' announcement was the result of continuing appraisal of the supply situation there since he determined on March 11 that the area would have to continue on the same basis as the rest of District 1.

'Not Swimming in Oil'

In the April 28 report, Mr. Ickes said: "There were no facts presently available which warranted relaxing western Pennsylvania schedules," and continued:

"Moreover, evidence that western Pennsylvania is not 'swimming in gasoline' and that gasoline is not 'slopping over storage tanks', as has been charged here and there, is seen in the fact that automotive gasoline stocks have been reduced substantially in recent weeks, and as of March 31, were only 83.7 per cent of what they were on March 31, a year ago."

PAW Deputy Davies added these figures: Total automotive gasoline stocks in refineries and terminals in western Pennsylvania reached 1,171,959 bbls. on Feb. 28. By March 31, they had dropped to 923,478 bbls. In the Pittsburgh-Freedom section, automotive stocks reached 926,910 bbls. on March 3, and as of April 14, stood at 544,745 bbls.—a drop of 382,165 bbls., or 41%.

Says Shipments Decline

Mr. Davies said PAW had received reports that gasoline shipments from western Pennsylvania to New England and the Middle Atlantic States had declined because buyers had not been able to find additional supplies in the western Pennsylvania area.

During the first 8 days of April, he added, gasoline shipments out of this area were at the rate of about 10,000 b/d, but since then have dropped to about 5,000 b/d.

OPA Hikes Allowance For Evaporation

WASHINGTON—OPA has instructed local rationing boards that, at their discretion, they may allow for up to 1% evaporation and contraction losses in a gasoline retailer's inventory instead of the 0.5% previously allowed. It was disclosed at the April 29 meeting of OPA's eastern gasoline industry panel (see story elsewhere) that a ruling on this had been sent out to local boards 2 months ago.

Ruling provides that claims should be filed on a quarterly basis. This allowance is in addition to claims for coupon loss, destruction of inventories by fire, etc.

Full text of ruling follows:

CERTIFICATION OF SHORTAGE
(FORM OPA R-549)
Refer to Regulations, Section 1394.8216

(2421)

Dealers and intermediate distributors shall be permitted from time to time to apply on Form OPA R-549 for replenishment for losses of gasoline through evaporation, handling accident, or other extraordinary circumstance, and for unavoidable loss of coupons.

In considering certificates of shortage, you should bear in mind that normal allowances for evaporation should be very small. The allowance for evaporation should seldom exceed one per cent (1%) of total inventory plus receipts reported on line C, Item 2 of Form OPA R-549. Where at times this percentage is exceeded, the Board should examine previous certificates of shortage filed by the applicant to determine whether the average for the year is within one per cent.

In applying for inventory coupons to replace shortages of gasoline, coupons, or other evidence, the dealer or intermediate distributor must fill out the "Certificate of Shortage" and present it for approval to the Board with which the place of business where the shortage occurred is registered. (Licensed distributors account for their shortages on their Reconciliation Form (OPA R-550) which they file with their tax reports.)

If you believe the facts stated on Form OPA R-549 to be true, and that the shortages were not caused by violations of the Regulations, and if you find any claimed gasoline shortage to be reasonable, you will give the applicant inventory coupons in an amount equal in gallonage value to the amount of the shortage. Retain the shortage certificate in file with your copy of his registration certificate.

Form East Coast Kitty For Federal Needs

WASHINGTON — The federal government's petroleum requirements on the East Coast were taken out of Directive 59 quotas on May 3 with issuance of Amendment 2. The new amendment, PAW Ickes explained, does these things:

1—Provides a petroleum "kitty" to assure supplies of principal petroleum products contracted for by the federal government in the East Coast area.

2—Protects the supplier who obtains government orders by providing that supplies for the government will be withdrawn from the kitty and will not affect the allotment given the supplier for his regular business.

Some independent suppliers, both primary and secondary, have been complaining that they couldn't get supplies to fill their government contracts.

Here's how Deputy PAW Davies explained the mechanics of the amendment:

The Treasury Procurement Department asks for competitive bids on requirements of gasoline and principal petroleum products each quarter.

The figure for the estimated quantity of each product will be turned over to the Petroleum Administration which, in turn, will arrange with the East Coast supply and distribution committee a "kitty" of such products in the quantity needed.

Independent of Regular Quota

This kitty will be independent of the amount of such products allotted to any supplier for civilian consumption.

Any supplier will have the opportunity to secure through the primary supplier and the supply and distribution committee the products for delivery to the federal government if the supplier is the successful bidder under the Treasury Department procurement contract.

PAW Ickes said the move was made to insure delivery of the entire essential requirements of the federal government at the time and places needed, and "to offer both primary and secondary suppliers the opportunity to enter competitive bidding to provide these requirements."

Mr. Ickes said past cooperation of the industry in supplying these requirements has been gratifying, but some suppliers have hesitated to enter the bidding because of uncertain sources of supply. Now, Mr. Ickes said, any supplier will be assured that such products will be available without disturbing the allotment given for his regular business.

Petroleum Totals 4 Percent Of All Lend-Leased Goods

WASHINGTON—Of the total $10,319,518,000 worth of lend-lease aid rendered by the U.S. from Mar. 11, 1941, to Apr. 1, 1943, petroleum products represented $413,312,000, Lend-Lease Administrator Stettinius reported May 2.

Fifty-five percent of goods transferred to date, he said, has been munitions, 27% industrial supplies (which includes petroleum products), 15% food and 3% other agricultural products.

In last 3 months for which export figures are available, lend-lease shipments were divided as follows:

United Kingdom	38%
Soviet Union	31%
Africa & Middle East	16%
Far East (including India)	14%
Other Areas	1%

WASHINGTON—Conversion of industrial and commercial fuel oil burning facilities to some alternate fuel on the East Coast totaled 410,943 bbls. in week ended April 23, PAW reported April 29. Total annual savings to date from heavy fuel oil conversion campaign on the eastern seaboard amount to 40,939,409 bbls., PAW said.

On Capitol Hill . . .

What Congress is Thinking and Doing on Oil Problems

By WILLIAM J. MADDOX, NPN Staff Writer

WASHINGTON—Members on both sides of Congress are giving increased attention to steps for easing the impact of peace, when it comes, for the business and industry of the country.

Some provision must be made, they feel with growing keenness, to enable industry and business to shift from high to low without stripping gears. Otherwise, they look for heavy casualties in many lines, particularly among the smaller concerns.

The big question, looking toward readjustment, is assuring organizations enough reserves to rehabilitate themselves for the peacetime letdown.

The answer seems to be by way of tax legislation.

A step in that direction was taken in the 1942 revenue legislation in providing a postwar credit for corporations of 10% of their excess-profits tax.

The company pays the full excess-profits tax. Ten percent of this, the post-war credit, is credited to the taxpayer's account and issued to the company in bonds payable after the war. The bonds bear no interest, are non-negotiable and may not be transferred by assignment, pledge or otherwise.

In the meantime the government has the use of the money interest free.

NPN took the question of rehabilitation up with Rep. Wesley Disney, Okla., particularly the outlook for the small oil companies that will have to make replacements after the war.

Right off the bat Disney said he thought the 10% credit was not high enough—it ought to be 20%. And as a leader of the powerful ways and means committee, Disney may try to do something about it when general revenue legislation comes up a month or so hence.

"Post war adjustment for oil companies is a serious problem," he said. "I don't know about the future of oil companies. But undoubtedly the big companies will have the advantage.

"Whatever Congress does for the small company will have to be done for the big one too.

"The big company has a club over the small one in the question of price. The small companies will continue to sell out to him. In this way, a low price for oil creates a powerful trend toward monopoly."

The bill of Ways and Means Chairman Doughton, N. C. (H. R. 2324) for renegotiation of government contracts offers scant hope for the small fellow because he has practically no government contracts. Doughton's bill would raise the renegotiable exemption from $100,000 to $500,000 aggregate sales a year.

Although the problem seems to rest with the framers of revenue legislation, Sen. Murray, Mont., chairman of the small business committee, proposed to take the matter up with his group. The situation that will face the small oil company was brought to his attention by an editorial in NPN of April 14.

Sen. George, Ga., chairman of the finance committee, also has taken up the problem. In a speech before the Chamber of Commerce of the U.S. in New York April 30, the Georgia senator expressed the opinion:

"Reserves for postwar contingencies and for conversion to peacetime activities, and for deferred maintenance and repairing, must be established and built up out of earnings during the war."

Many industries at the end of the war, he said, will "face very difficult problems if not bankruptcy or receivership. This undoubtedly will be true unless we meet the threat through some form of savings for use in the postwar years and the speedy change in our revenue laws to permit the creation of reserves, before taxes or at least upon favorable tax terms."

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WPB Chief Donald Nelson is doing some maneuvering to head off the bill of Sen. Maloney, Conn., (S. 885) to establish a Civilian Supply Administration. Nelson's creation May 1 of a new WPB office of civilian requirements headed by Arthur D. Whiteside is an attempt to keep within WPB powers that the bill would give to a new agency.

Nelson's new office replaces the old Office of Civilian Supply headed by Joseph Weiner.

Some members of Congress have been clamoring for a spokesman for civilian needs—one that would have an equal voice with the military.

Maloney's bill has had impressive backing. Nelson damned it heartily when it was before the banking and currency committee. Rubber Director Jeffers thought it a good idea to set up a separate agency to speak for civilians.

The real power behind the bill, however, was disclosed when the committee unanimously reported it out favorably, with Administration Spokesman Barkley, Ky., among them.

Stabilization Director Byrnes is understood to have given his nod to the bill. The committee did not call him to its hearings because it did not want to put him on the spot publicly in a clash with Nelson and Man-Power Administrator McNutt, who also opposed creation of the new agency.

Actually, the proposed new agency would have power to "recommend", but its creation would be a good political gesture to the civilians. The administrator would be a sort of "people's advocate".

It would be almost impossible for any agency to override military demands. If the military say they have got to have something to carry on the war, they are likely to get it.

Nelson undoubtedly had the Maloney bill in mind when he told the Truman committee April 27 that conflicts between military requirements could be settled by the military, but "between military and civilian programs, that's my job—and I'm going to continue to settle them."

Nelson's action comes a bit late, and it's doubtful if it will choke off enactment of the bill.

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Members of Congress in the oil controversy are "burning" over Fuel Price Chief Sumner Pike's attitude on oil prices. They say openly they are out to "get" him, not only as OPA pricer but as member of SEC. They are waiting for his renomination to SEC to come before the Senate, now only a matter of weeks, unless he decides to leave government service entirely.

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Sen. Gillette, Ia., says his committee is just marking time with its investigations of alky rubber. He's preparing to call Rubber Director Jeffers for up-to-date information on the rubber situation, but he is waiting to see what Sen. Truman's committee brings to light in its investigation of the "priorities battle"—100 octane vs. synthetic rubber.

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The question of natural rubber supplies from abroad after the war will be injected into discussion of the bill to extend the reciprocal trade agreements act. The bill, as reported to the House by the ways and means committee April 27, contained an amendment allowing the president to suspend modified duties when he thinks international cartels exist to defeat the purpose of the act. Rep. Dewey, Ill., author of the amendment, had in mind agreements that would create an artificial price for such a commodity as rubber.

WPB Claims No Need to 'Screen' Flowmeter Purchase Orders

WASHINGTON—WPB on April 3 said there is no need for it to "screen" purchase orders for differential type flowmeters, used largely in production of rubber and octane gas, according to producers at a meeting of the differential flowmeters industry advisory committee with the radio and radar division of WPB.

Differential flowmeters are listed as a critical common component in order M-293, but are not classified as "Y" item which would call for WPB review of new purchase orders.

Manufacturers, WPB said, stated that the industry is not meeting with difficulty in making deliveries. Current orders by all of the claimants call for delivery dates so far in advance that they can be fitted easily into delivery schedules.

Schedules of manufacturers of flowmeters no longer are jammed as they were a few months ago, producers were told.

'Gas' Rationing OK in 2 Counties

Weighty Survey by Agriculture Department, Made for OPA, Finds The People of Cuyahoga and Clark Counties (Ohio) Aren't Very Unhappy

WASHINGTON — Of course, you can't please everybody. Otherwise Cleveland and Clark County, Ohio—selected by the U. S. Department of Agriculture for what they call a "pilot study" of mileage rationing—might have gone all out 100% for OPA and gasoline rationing.

Results of the super-duper government poll—labeled "For Administrative Use Only"—was revealed to NPN by Rep. George H. Bender, Ohio Republican.

In the main, car owners of Cleveland and Clark County are well satisfied with OPA's administration of rationing; they are getting at least as much gasoline as they need—some A book holders even had "expiration parties" at the end of the first rationing period—and a few have heard of "black markets".

The study was made by the program survey division of the Bureau of Agricultural Economics. Copies are not available, but it is known as Study 61, Report No. 37.

Cleveland was selected as a sample of "a large urban community" and Clark County as "a small-town rural county". Interviews were obtained from 197 car owners in the former and 196 in the latter where 36% respondents were farmers.

Here are some sample questions:

"Would it be impossible for you to get along if you couldn't get any gasoline at all (for highway driving)? How would you get to work? How far is your job? (Probe thoroughly—Why can't he get along on no gas?)

"Have you ever heard of people getting gas without giving the dealer coupons? (if yes) How do they do that?"

"Have you ever heard of people getting extra coupons from their friends? (If Yes) Did they buy them or was it just a gift?"

"How about the people in charge of the national gas rationing program, what kind of a job do you think they're doing? How's that? (Note whether he mentions OPA in Washington or ODT in Detroit.)"

Among the "implications" drawn from the study, the report finds "it is not possible to determine exactly from the present survey why the gas rationing program has been so much better received in Cleveland than in Clark County. The fact that a gasoline pipeline passes through Clark County may have been a contributing factor. It is also conceivable that the anti-gas rationing propaganda which recently emanated from Indianapolis filtered into Clark County but not into Cleveland.

"In all probability neither of these factors is the fundamental source of the real differences in attitudes toward gas rationing," the report states.

It was found that A books are well understood, but the B and C books are something of a mystery. Only 3% of the A book holders and about 4 times as many B and C holders "admit that they do not know the value of an A book". The "implication" drawn is that "the present system of ration books will never be well understood by the general public".

Car owners are not "generally alarmed" about black market activities in gasoline although a good many say that they have heard about such practices, the report states. Slightly more people in Cleveland seem to have heard of the practice than in Clark County.

PAW Acts to Liberalize Well Spacing Rules

WASHINGTON—Carrying out Deputy PAW Davies' promise of well-spacing regulations for certain areas more liberal than the 40-acre rule in PAO No. 11, PAW is working up a set of specific regulations for different producing areas. Liberalized well-spacing order on California already has been issued (**NPN, April 28, P. 6**). Others for areas in the mid-continent and other sections are in the making.

There will be no provision for selective drilling in these forthcoming regulations, NPN learned authoritatively.

Nearest to being promulgated is the well-spacing order for eastern Oklahoma and eastern Kansas. Criterion of the liberalized spacing regulations for this area will be depth of the wells, with shallower wells—especially sand wells—getting preference. Minimum spacing may be cut to as little as 5 acres for very shallow wells, with graduations up to 10 acres, 20 acres and 40 acres for deeper wells. More liberal spacing will be allowed also on installing pumping equipment. At present, pumping equipment may be installed on only one well to each 10 acres. This may be changed to a 5-acre spacing with shallower wells getting preference.

PAW Asks District Committees To Aid In Manpower Study

WASHINGTON—District committees are being given a large measure of responsibility for handling manpower problems in the oil industry, including determination of labor priorities if and when necessary.

Committees in each district have been requested by PAW to determine manpower requirements, advise PAW division directors of the effect shortages will have on various programs, inform division directors when labor shortages interfere with industry programs, and clear the way for exchange of information on deferring key men and replacing men inducted into the service.

What Oil Spends on War Projects Is Subject of PIWC Survey

WASHINGTON — A brief questionnaire has gone out to about 500 oil companies from Petroleum Industry War Council to determine extent of petroleum-industry capital expenditures in war projects, exclusive of government-financed projects. Chairman Boyd said statements are sometimes made that the government is financing all war projects of the oil industry or that the industry is being paid in full by the government for most of the plant changes and additions it is making for war purposes.

"We do not have any exact figures," Mr. Boyd said, "to refute these ill-informed charges, however, and the Council feels that we should know as accurately as possible just how much the oil industry is spending."

Any interested companies who did not receive a copy of the questionnaire were urged to obtain one. This can be done by writing to Petroleum Industry War Council, Commonwealth Bldg., 1628 K Street, Northwest, Washington, D. C.

Maloney Not Satisfied With New OCR Unit

WASHINGTON—WPB's new Office of Civilian Requirements, set up by Chairman Nelson May 2, does not suit Sen. Maloney, whose bill (S. 855) to create a Civilian Supply Administration independent of any other agency is pending in the Senate.

Sen. Maloney told NPN the new office did not meet the situation as he saw it and that he would press for early action on his bill. The measure had the full support of the banking and currency committee, including that of Sen. Barkley, which gives the color of administration approval.

Arthur D. Whiteside, named by Mr. Nelson as director of the new office, has power to determine rationing policies and can issue directives telling OPA when, where and how much goods are to be rationed. His authority tops that of Rubber Director Jeffers on how much rubber can be used and for what.

Food, housing and transportation are not included in the scope of the new office.

Under an agreement Mr. Nelson made with PAW Ickes last January, the OCR will estimate civilian requirements of petroleum products—gasoline and fuel oil. But Mr. Ickes remains boss of how much of these are available for civilian use.

Go-Between with OPA

Mr. Whiteside will act for Mr. Nelson in going to OPA on pricing problems, including those of the petroleum industry.

OCR takes the place of the old Office of Civilian Supply, headed by Joseph L. Weiner. What becomes of Mr. Weiner has not been announced. It is known that a number of shifts of key men are to be made, but as yet Mr. Whiteside has not completed his organization.

WAR ORDERS *for the* OIL INDUSTRY

Every care is taken each week to list every order, rule and regulation issued by any war agency and applicable to all branches of the oil industry. Since these orders are so numerous, however, we will appreciate our readers' cooperation in letting us know when they feel that we have omitted a regulation.

Complete copies of the official text of every order on oil can be obtained from PLATT'S OIL-Law-GRAM, 1213 W. Third St., Cleveland, Ohio, a publication which reproduces and mails out the orders on oil immediately upon issuance. Minimum charge for single copies, $1, postage paid. One year's service, $75.

Code: AO—Administrative order; RO—Ration order; L—Limitation order; M—Conservation order; P—Preference rating order; PS—Price schedule; RPS—Revised price schedule; MPR—Maximum price regulation; GMPR—General maximum price regulation; SUPP.—Supplementary; Reg.—Regulation; GO—General order.

The Week's Orders

(Issued from April 24-May 1, inclusive)

PAW—Petroleum Administration for War
- OAO 2—Compliance Section
- Dir. 59—District 1 quotas, Am. 2
- Dir. 65—District 2 supply, Am. 1

RO—Ration Orders
- 1A—Tires, Am. 27
- 5C—Gasoline, Am. 45
- 11—Fuel oil, Am. 61

PR—Prices
- 137—Kerosine, Am. 32
- 341—Used trucks, Am. 1

L Orders
- L-61—Tire retreading equipment
- L-211—Tubular goods, Schedule 9
- L-270—Automotive maintenance equipment

WFA—War Food Administration
- FPO 11—Pyrethrum insecticides

Digest of Week's War Oil Orders

PAW—Petroleum Administration for War

COMPLIANCE SECTION—OAO 2—Responsibility for dealing with violations of PAW orders is assigned only to Compliance Section of Legal Division; operators charged with violation will be advised by letter or telegram and may answer charges by mail or at a conference; issued 4/22.*

SUPPLY—Dir. 65, Am. 1—Approval of manager of District 2 zoning plan no longer required for tank car shipments; approval required only by PAW Director of Supply or District Director; issued 4/20, released 4/27.*

Dir. 59, Am. 2—Federal government requirements in District 1 will not be counted in determining quotas, but suppliers with such contracts will draw from kitty set up by supply and distribution subcommittee; issued 4/24, released 4/30.

OPA—Office of Price Administration

FUEL OIL RATIONING—RO 11, Am. 61—No emergency rations in cases of threat to health or property to be issued after April 30; all such rations already issued expire on same date; issued 4/29, effective 5/1.

GASOLINE RATIONING—RO 5C, Am. 45—Allowance for course-of-work driving outside eastern gasoline shortage area raised from 470 to 720 miles per month; issued 4/26, effective 5/1.

KEROSINE—MPR 137, Am. 32—Kerosine retail prices in Puerto Rico set at 18c per gal. or 5c per qt. when sold in less than 1-gal. amounts; issued 4/27, effective 5/3.

TIRE RATIONING—RO 1A, Am. 27—New tires for farm tractors will be granted in areas where recapping facilities are unavailable or inadequate; issued 4/26, effective 5/1.

TRUCKS, USED—MPR 341, Am. 1—Alternative pricing method set up for determining "value when new" of extras included in purchase of used trucks; price may be manufacturer's original retail list price, or, if unobtainable, then current retail prices for same or comparable extras in area in which vehicle is being sold. Pricing method also set up for used chassis attached to new body; issued and effective 4/28.

*Not released on date of issuance.

WPB—War Production Board

AUTOMOTIVE MAINTENANCE EQUIPMENT—L-270 as amended April 29—Use of copper or copper base alloy prohibited for automotive equipment where use of less critical material is practicable; former use of copper for conducting electric current, in bearings, bushings and check valves, and where non-corrosive metal is required is therefore eliminated; issued and effective 4/29.

TIRE RETREADING—L-61 as amended April 29—Controls over distribution of used tire retreading, recapping and repair equipment lifted; acquisition of new equipment permitted if retail value is $85 or less; such new equipment includes all items except curing heads and matrices; applications under amended order are to be made on form PD-840; issued and effective 4/29.

TUBULAR GOODS—L-211, Schedule 9—Production of oil country tubular goods limited to 168 items instead of former 300; exceptions made for oil well casing produced by electric fusion welding, for order entered prior to April 30 if delivery is made before June 30, and in special cases for items with special thread dimensions or types of joints; issued and effective 4/30.

WFA—War Food Administration

PYRETHRUM INSECTICIDE—FPO 11—Dealers may not sell pyrethrum insecticides for agricultural purposes unless buyer shows certificate of use for pest control of commercial crops or Victory gardens, or in dairy barns; exception granted for delivery of 3 lbs. (solid) or 1 qt. (liquid) to any person; issued 4/29, effective 5/1.

Official Text of Important Orders

PETROLEUM DIRECTIVE 59, AS AMENDED,
AMENDMENT 2
TITLE 32 — NATIONAL DEFENSE
CHAPTER XIII—PETROLEUM ADMINISTRATION FOR WAR
PART 1510 — SUPPLY
PETROLEUM DIRECTIVE 59, AS AMENDED,
AMENDMENT NO. 2

Section 1510.29 (Petroleum Directive 59, as Amended February 10, 1943, 8 F.R. 2041) is hereby amended by changing Section 1510.29 (e) to read as follows:

(e) Subject to the supervision of the District Director of Marketing, District One, the subcommittee shall arrange for purchases, sales, exchanges, and loans of the Principal Petroleum Products among the Original Suppliers so as to provide each such Original Supplier with a proportionate part of each of the Principal Petroleum Products available for distribution in each zone on the basis of the sales position of each such Original Supplier as determined under Section 1510.29 (a) hereof.

Subject to the supervision of the said Director, the subcommittee may withhold from the amount of each product expected to be available for distribution as shown by the supply forecasts referred to in Section 1510.28 hereof, an amount not to exceed three per cent of motor fuel and five per cent of the other Principal Petroleum Products as a supply subject to distribution to Original Suppliers by the subcommittee under the supervision of the said Director to meet emergency, extraordinary, or unexpected conditions that may arise with respect to any Original Supplier.

The Director of Petroleum Supply shall notify the subcommittee as far in advance as is practicable of the quantities of Principal Petroleum Products required by the various Federal governmental departments and agencies for consumption in District One. Such notice shall specify the times when such products are required, and the Supply Terminals and supply area where they are required. Such quantities shall be withheld from the amount of each Principal Petroleum Product expected to be available for distribution, as shown by the said supply forecasts, in addition to the amount withheld as above provided. Subject to the supervision of the said District Director of Marketing, such quantities of Principal Petroleum Products will be assigned by the subcommittee, as and when needed, to the Original Suppliers who obtain or whose customers obtain contracts with the Federal Government to supply said products. It shall be the duty of each Original Supplier on behalf of his customers promptly to obtain an assignment of such Principal Petroleum Products as may be required to provide the amounts thereof which such customer has contracted to supply to any Federal governmental department or agency, and it shall be the duty of such Original Supplier to assure that such Principal Petroleum Products are made available to such customer for delivery to meet such customer's contractual commitments therefor to the Federal Government. Each Original Supplier who has or whose customers have contracts with any Federal Government department or agency shall promptly notify the subcommittee of any increase or decrease in the requirements of any such department or agency under any such contracts, and shall render monthly statements to the subcommittee setting forth the quantity of Principal Petroleum Products actually delivered under such contracts during the preceding month.

The terms and conditions of any sale, loan, or exchange to be made pursuant to this section shall be negotiated between the individual parties to any such transaction: PROVIDED, HOWEVER, That:

(1) If delivery under the sale is made in Zones One, Two, Three, Four, or Five, District One, the price agreed upon by the parties shall not exceed the applicable maximum price regulation, as amended or supplemented, or other order of the Price Administrator, or the sum of the following items, whichever is lower:

(i) The value of the product at the normal origin as provided in section (5) (b) (ii) of Petroleum Compensatory Adjustments Regulation No. 1, issued by Defense Supplies Corporation.

(ii) The cost of transporting the product from the normal origin by the normal method of transportation which was used during the calendar year 1941 to the supply terminal as determined by Petroleum Compensatory Adjustments Regulation No. 1, except that if, at any supply terminal designated on the schedule referred to in Section 1510.29 (b), such normal cost differs as between Original Suppliers, then the Director of Transportation, Office of Petroleum Coordinator for War, may establish the cost of that normal method of transportation by which the greatest volume of the particular product normally moved to the supply terminal. In such event, such cost shall be used by all Original Suppliers using said terminal.

(iii) Reasonable storage and handling charges incurred by the seller within District One for which no recovery may be had under Petroleum Compensatory Adjustments Regulation No. 1: PROVIDED, HOWEVER, that such charges shall not exceed the thruput rates which may be established and approved pursuant to Section 1510.29 (c) for each supply terminal.

(iv) Cost of any additional transportation from the supply terminal to the point at which delivery is made by the seller to the buyer, for which no recovery may be had under Petroleum Compensatory Adjustments Regulation No. 1.

(v) The amounts or revenue resulting from any increase in the maximum price of the product sold which must be accounted for under the Plan for Equitable Sharing of Revenue and Extra Transportation Expenses approved under Recommendation No. 12, or under Petroleum Compensatory Adjustments Regulation No. 1 issued by Defense Supplies Corporation.

(vi) Any and all taxes which the seller is required to pay with respect to the transportation, sale, or delivery of the Principal Petroleum Product so sold.

(2) If delivery be made in Zone Six, District One, the price agreed upon by the parties shall allow for a reasonable margin below the prices generally prevailing for sales to other classes of resellers. Such price shall not exceed, however, the applicable maximum price regulation as amended or supplemented, or other order of the Price Administrator.

In the event the individuals are unable to agree upon a fair and reasonable price hereunder, then any such dispute shall be referred to the Director of Petroleum Supply, Office of Petroleum Coordinator for War, for such action as he may direct.

(3) Sales between Original Suppliers made in accordance with the price provisions set forth in Section 1510.29 hereof and which are arranged for by the Subcommittee of Supplies and Distribution under this section, shall not be deemed to effect any discrimination against any buyer (including any Original Supplier) to whom any sale not arranged for under this section is made at any higher price permitted under any applicable price regulation.

(E.O. 9276, 7 F.R. 10091; E.O. 9319, 8 F.R. 3687).

Issued this 24th day of April, 1943.

(Sgd) R. K. Davies
Deputy Petroleum
Administrator for War.

The EDITOR'S Page

Readers comments and opinions will be much appreciated by—WARREN C. PLATT, NPN's Editor and Publisher, Penton Building, Cleveland, O.

Preserve Independent Fuel Oil Distribution

THE discontinuance by government agencies of their campaign to force conversion of home owners and other small installations, from oil to coal, as at present reported from Washington, promises a new lease on life to quite a few thousand independent distributors of fuel oil all over the country.

The government's conversion campaign was fast threatening the very existence of distributors other than the major oil companies. So drastic was the threatened decline in domestic fuel oil consumption that it was easy to anticipate that by next winter a very important part of the independent competition of the major oil companies would be no more. That would have left the major oil companies in the unhappy political position of being subject to attack as a "monopoly," and of having "driven out their competitors," both favorite accusations of reformers.

In addition to putting independent competitors out of business, the government's oil-to-coal conversion campaign was imposing increasing hardships on small homes. With the young people off to war, and young girls working in offices and factories, it is quite a hardship on mamma and grandma to have to go down in the cellar and shovel coal and carry out ashes, when their clean, easy-to-operate oil burning mechanism is taken away from them.

How effectively the government's oil-to-coal conversion program was threatening the life of independent fuel oil distributors is disclosed by the following letter to the editor from a veteran oil man in the Atlantic Coast Area. The editor has known this man for many years. He has known him as an exceedingly good business man, one who has always sold at good prices and who has kept his business in an efficient state. Yet here is his testimony as to how the government's program is putting him out of business. This man did not write the editor for publicity, so we are not identifying him.

What some of the proponents of these drastic oil industry reform measures overlook is that when those measures, no matter how much they seem to be warranted by war, get to the point of destroying businesses to building which people have given their lifetime, then those who are about to be executed will go to Congress or anywhere else necessary to preserve those businesses. These men would gladly give their lives and their buinesses in the war if they thought it was necessary, but there has been so much waste, so many faulty policies and decisions, so many unnecessary reforms instituted in the name of war, that no American citizen can be criticized for challenging the justice of measures which he knows will destroy his business.

Writes our reader:

"As you know, I am and have been a subscriber for several years to both the *OILGRAM* and NATIONAL PETROLEUM NEWS, and also subscribed to the *OIL-LAW-GRAM* since you began that service, and I enjoy those services very much. I wish to present to you as briefly as possible my problem and I assure you that any information or advice which you may be so kind as to forward me will be kept in the strictest confidence.

"I have been engaged in the oil business 22 years, during which time my business from its very beginning has developed in a most satisfactory and profitable manner. My business today represents an investment upward of $350,000. I am confronted with the problem of possibly having to close my operations. You can well realize that this is a most unpleasant position to be in.

"THE cause of this trouble is due mainly to the government's mandatory oil-to-coal conversion program, although the very narrow margin which we have been forced to operate under due to OPA price control has also made it difficult. For the past dozen years my business has been devoted *entirely* to the sale of kerosine and all grades of fuel oils from No. 1 oil, the lightest grade, to No. 6 fuel oil, the heaviest grade. Our main business has been the distribution of heavier grades of fuel oils—that is, to industrial and large commercial users, and as you know, the government through PAW has since the early part of this year forced conversion orders on our customers.

"Frankly, our customers have not been interested to convert readily, and many of them have not as yet converted, even though they have been pressed to do so. If PAW continues to press these many customers, and conversions are actually made, it will make our future operations most difficult. Of course, several of our very good customers who have traded with us for years have already converted. I can get along without that business, but I feel I cannot continue to lose more business and continue our operations. It seems advisable in my judgment to present my position to the proper authority in government, and I feel you are in an excellent position to advise me as to whom you would recommend I present this situation.

"OUR problem has not been one of having trouble of securing source of supply, nor do I feel that we will have any trouble in securing additional stocks. We have a total terminal storage capacity of between 10 million and 11 million gal. All of our products have heretofore been transported by barge. Our normal source of supply has been at New York Harbor, but with the change which came about last season we were not permitted to purchase oils at that point and were obliged to look to suppliers on the Great Lakes. I have established friendly connections with refiners on the Great Lakes and feel sure I can secure all the oil we need, but of course that will do us no good if we are not permitted to sell it to our customers or if they are forced to convert to another type of fuel. I assure you that I will very much appreciate any effort you will take to assist me in this matter."

We told this independent distributor to contact those at Washington and elsewhere who are proposing the dropping of the campaign for conversion to coal of domestic outlets, and that he should be able to lend his strength, and perhaps enlist the strength of his representatives and senators toward establishing that policy, so that independent distributors may be preserved.

While NPN has never believed in charity for charity's sake in business, nor has it believed that any particular type of company had any constitutional rights over anybody else, nevertheless it might be long-range intelligent business for the major oil companies to consider the desirability of their relinquishing such gallonage on gasoline, fuel oil, etc. to independent competitors as would insure continued existence of those competitors. It is true that such relinquishment could not always be done fairly to the last gallon; that such business given up would not always go to just the companies that the giver wanted to have the business; and it is true that there might be those in

some major oil company sales departments who would undertake to grab that gallonage, maybe even at cut prices.

Nevertheless, it might be sound oil statesmanship for the top executives of the major oil companies to study the possibility of insuring independent distribution competition by giving up some of their own direct distribution. The major oil companies would not suffer financially, because their volume of sales direct to the government will continue to increase, and the majors will need any men whose jobs they may abolish in their distribution organization, at other points in their set-up. But independent distributors sell little or nothing to government and war agencies.

The major oil companies might well consider: would not they be better off politically and financially in the long run if they concentrated on the government business and left more of the small consumer business to the independent outlets and to their independent competitors?

No Gasoline for Tractors— Why Not Run on Beer?

THE utter unfairness of the shoddy treatment that is being accorded the distribution division of the oil industry in not giving it an essential war activity rating, and in not permitting it to meet competing bidders for its men is described in a letter from E. E. Oplinger, vice-president of the Lehigh Valley Oil Company, Allentown, Pa. Mr. Oplinger writes the editor:

"Your editorial in your recent issue calling the oil industry's attention to that fact that, unless we get some protection for our employes' being essential, it will spell the doom for most of us, is certainly the truth spoken 100%.

"We are very much interested to know what the oil marketing associations are going to do about this because we realize that, as one company, our protests and appeal won't mean a thing, but united we certainly should be able to impress somebody in government with the fact that our employes are essential—if there is anything like essential employes in industry today.

"Recently one of our truck drivers who has been with us for several years, and incidentally was the only truck driver we had left at this bulk plant, took it in his head merely to stay home; but we are now informed that he has taken a position with a beer distributor as truck driver at about 50% higher wages than we paid him, and we were not permitted to pay him any higher wages because the War Labor Board has had our appeal for adjustment and equalization of inequalities in our salaries under advisement since the beginning of the year and we are not any further now than we were when we started. In fact, the latest advice to us was that because of President Roosevelt's directive, we'd better hold on for the time being. But in the meantime our employes are leaving us because of our being unable to adjust our wages.

"Among those for whom we have appealed for an increase is the manager of one of our successful stations who now is tired of waiting, and has gone out and gotten himself another job with a small single station operator. He was the only man we had remaining at this station, so we possibly will need to close this station because of not being able to adjust wages, and because a single station operator is able to take away our employes while our hands are tied.

"We always adjust our wages at New Year's and the salary freeze order, having come along in October of last year, caught us before we could make the proper adjustment. Now, with our inability to get permission to make any increases or adjustments to date, it leaves us wide open throughout our entire organization... for others who either are able to get increases in other lines of business or for war industry, to come in and take our employes away at apparently any salary they wish to offer.

"Under present regulations we are not classified as essential and yet, during the past week when we had hardly enough gasoline to keep 1 out of 8 trucks running at 1 of our bulk plants, the telephone wires were hot with requests for gasoline to keep farm tractors operating, keep trucks and busses moving, keep war workers going to war factories. We must have been essential this week because, when we didn't deliver the gasoline to keep this equipment moving, many machines on farms, roads, and highways had to stop. To us, that would make our work rather essential.

"We certainly hope that your editorial may have brought home to all in the oil industry the predicament we are in and that we are going to do something definite about it to have the protection for our employes as essential workers for the benefit of our successful prosecution of this war."

The last wage freeze order is puzzling to everyone, but as Mr. Oplinger says, it does impose decidedly heavy hardship upon oil marketing. Every marketer can take his problem to his local War Labor Board office or his local Internal Revenue Bureau office, but, as Mr. Oplinger points out, it takes time to get a decision.

The situation of this marketer again leads to the suggestion of the necessity of the oil distribution associations of the country being so organized that they can move fast when problems of this sort come up, and go to national headquarters or state headquarters for rulings that will apply immediately to all of them.

It is utterly unfair that breweries can hire oil company truck drivers—and at higher rates. Farmers can not grow the country's food supply with bottles of beer. Yet the dilatoriness of federal authorities in not recognizing the essentiality of oil marketing seems to force farmers in Mr. Oplinger's territory to use beer to grow their crops, while the tractors and other petroleum product machines are idle, or else not to raise any crops at all.

LETTERS FROM NPN READERS

You're Wrong, Dorothy

Dorothy Thompson, national columnist who writes daily and freely and oftentimes in all directions at once on all subjects, sounded off on synthetic rubber and the oil industry last week, with what may fairly be called her usual inaccuracy and disregard for the truth.

Her blast was so far away from fact as to the oil industry that W. T. Holliday, president of the Standard Oil Co. of Ohio, has attempted to answer her in a letter to the editor of the *Cleveland Plain Dealer* in which her column is published.

Even though President Roosevelt doesn't like some of the columnists who step on his toes, nevertheless they have done and are doing a good job of digging out facts and expressing points of view that newspapers either do not care to gather or, in the case of editorial opinion, do not care to assume the responsibility for.

However, the newspapers do seem to have fallen into a lethargy as regards checking their columnists for accuracy. By all the rules and laws of publishing the newspapers are just as responsible for what a columnist says as for what the editor may say. Therefore the newspapers should be checking voluble Dorothy, who long has been wandering rather far from the field of facts, and editing her copy down to the facts. If Dorothy had been confined to the facts her column on synthetic rubber, in which President Holliday points out the flaws, would never have been published.

Probably thanks to the false statements made by some government witnesses before the Truman committee a year ago, and thanks to unfair if not even downright false statements in that committee's rubber report, many inaccurate statements about oil and rubber keep bobbing into print. About all the oil industry can do is to nail those statements and call their publisher's attention to them as President Holliday has done. WCP.

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To the Editor
The Cleveland Plain Dealer
Cleveland, Ohio

Dear Sir:

As a constant reader of Miss Dorothy Thompson's column, I was astounded by the reckless expression of ignorance and misinformation in her column of Wednesday, April 28th, in which she attempted to discuss the controversy between Mr. Jeffers and Undersecretary of War, Mr. Patterson.

She assumed that the issue of this controversy was competition between high octane gas and synthetic rubber for the raw materials out of which they are made. There is no such competition because there is a superabundance of petroleum products to supply both programs.

The issue turns solely upon the apportionment of available critical materials for the building of equipment. The shortage is in such things as valves, compressors, turbines and instruments, all of which are needed in the construction of high octane gas plants, butadiene plants and ships.

1. *Miss Thompson stated: "We have a shortage of high octane gas because high octane gas ingredients are diverted to the manufacture of buna-S, and because the manufacture of buna-S from oil, which has not yet overcome all teething troubles and requires much critical material, has been favored over other processes which would not deprive the air forces of a single drop of gas."*

This statement simply is not true. There are more than enough petroleum products to supply the raw materials for both programs. About two-thirds of the content of 100-octane gas is cracked gasoline, which is not a raw material for synthetic rubber. The greater part of the construction work under the high octane

gas program is for the construction of catalytic cracking equipment to produce the base stock. The rest of this program is for the construction of plants to produce alkylate, which constitutes about one-third of the finished 100-octane gasoline. The charging stock for such alkylate is various components of gases which are normally produced in a refinery, especially at the cracking plants.

The construction work in the petroleum industry for the rubber program consists simply of the building of plants to convert certain components of refinery gases into butadiene. There is an abundance of these petroleum gases to supply the needs both of alkylate and butadiene plants.

2. *Miss Thompson states: "The Government has ignored every process except that of the oil companies." She assumes throughout her article that if the rubber program had been based upon alcohol the present issue would not have developed.*

This is not true, because the difficulty is shortage of critical materials for the construction of manufacturing equipment, and a program based entirely upon the manufacture of butadiene from alcohol would have required much more equipment than is required by the present synthetic rubber program.

You can make butadiene (which is the principal ingredient of buna-S rubber) from certain liquefied refinery gases or from alcohol. Such gases are produced as a byproduct from the operation of existing oil refineries. A program based upon alcohol would have required the construction of new distilleries to make alcohol. In addition to other critical materials, the construction of such distilleries would have required huge quantities of copper, and the problem of shortage of critical materials would have been terribly intensified.

It is not true that the Government has ignored every process except that of the oil industry. Although the exact figures are not known, it is known that the present rubber program includes considerable plant capacity for the production of butadiene from alcohol produced from the present distilleries. The breakdown given in the rubber director's Progress Report No. 2 divided the sources of butadiene for the buna rubber program as follows:

From Alcohol	220,000 tons
From Petroleum products	636,860 tons

Practically all of that alcohol comes from existing distilleries and explains our liquor shortage. As stated above, to have built new equipment for the production of alcohol would simply have increased the requirements of critical materials for plant construction. Furthermore, a gallon of alcohol and a gallon of the appropriate liquefied petroleum gases will produce practically the same yield of butadiene, but the price of alcohol is about twice that of the liquefied gas.

Also if alcohol were to be the base for the rubber program, alcohol could be produced from petroleum much cheaper than from grain. The competitive price which a rubber program based on alcohol could pay to the farmer for his grain would certainly not be attractive to him.

3. *Miss Thompson then goes off on another tangent and suggests that the Government is derelict in failing to place a larger part of its rubber program on the basis of isoprene instead of butadiene. She states, "The Baruch report has already stressed that the ideal base for synthetic rubber would be isoprene."*

I have been unable to find any mention of isoprene in the Baruch report. The Baruch report does mention neoprene, the base of which is similar to isoprene, and states: "Neoprene is the one synthetic rubber which has been shown to be the full equivalent in quality of natural rubber for combat and heavy duty tires." The Baruch report recommended the construction of neoprene plant capacity amounting to 69,000 tons a year. Neoprene was merely to supply certain specialized needs in the rubber program, since the high costs involved in its manufacture made it appear to be unwise to put too much reliance on this type of synthetic.

As for isoprene, which Miss Thompson thinks has been unduly neglected, I would quote from a paper by Dr. H. L. Trumbull of the B. F. Goodrich Company, published in the October, 1942, edition of "The Refiner":

> "Chemists have known for over 50 years that the hydrocarbon which constitutes the bulk of natural rubber is a polymer of isoprene . . . The source of isoprene most frequently employed by chemists has been either natural rubber or turpentine. Obviously there is no point in trying to synthesize an elastic material by starting with natural crude rubber. Decades of study have discouraged chemists from trying to derive large quantities of isoprene from scrap rubber. The limited supplies of pine resins and turpentines available as starting materials have been fantastically out of balance with the demand for the large quantities of elastic materials which we need in our huge rubber industry. Until the last few months, isoprene has not been a commercial product in this country, and therefore the challenge which we face is to synthesize products showing appropriate physical properties, not a particular chemical composition. In other words, the synthetic rubbers which will be made are not strictly rubber. It is the behavior of the product under severe service which concerns us, not its chemical composition."

I have no personal interest in this rubber program. My company does not make and is not contemplating making butadiene or any other ingredient for synthetic rubber. My company is making 100-octane gas and is building additional plant facilities for such production. I am simply sitting on the sidelines so far as the soundness of the Government's rubber program is concerned, but I do object to the false conclusion which Miss Thompson comes to, on a basis of false assumptions, that greed of the oil industry is grounding our planes.

It is the Government which has mapped out the programs both for aviation gas and rubber. That program is changed from time to time with the changes in war problems, and only the Government has the information as to the respective needs of the two programs from time to time. Mr. Ickes testified before the Truman Committee this week that more aviation gasoline will have been produced every day this month than the military requirements' figures last January estimated would be required at this time.

The oil industry is building, mostly at its own expense, whatever equipment the Government asks it to build for the production of aviation gas. The Government itself is paying for and owning whatever equipment is necessary for the manufacture of butadiene. So far as any monopoly in the rubber program is concerned, it is a monopoly of the Government itself. Miss Thompson concludes her article with the words "greed and monopoly". That conclusion may logically follow from her various assumptions, but every one of those assumptions is false.

Very truly yours,
W. T. Holliday.

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Zone Committees

FROM: G. A. Primm, executive secretary, Illinois Petroleum Marketers Assn.

TO: The Editor.

In the April 29 issue of NATIONAL PETROLEUM NEWS on page 4, column 3, the following comment was made:

> "Suggestion was made from the floor that appointment of zone advisory committees might be helpful, but opinion varied, and no conclusive action was taken."

This statement is not correct. I made the following motion and it was adopted:

> "That zone area advisory committees be appointed with the approval of the Petroleum Administrator, and that the appointed membership of such advisory committees have equal representation of Majors and Independents."

This resolution is a matter of record of the meeting, and as stated above, it was adopted.

I give you this information thinking perhaps you might wish to correct your statement as quoted above.

Urged Shorter Station Hours 4 Years Ago for Economy

NPN News Bureau

CLEVELAND—Antedating by over 4 years PAW's Order No. 4 was a suggestion by L. H. Alexander, Fostoria, Ohio, Seneca Oil Co., that service station hours be shortened by legislation.

His suggestion was made in a letter to NPN, published in the Dec. 28, 1938 issue.

At that time, Mr. Alexander's argument was that greater net profits would result to retail outlets through lowered operating costs by operating the outlets "a maximum of 12 hours per day, with an established opening and closing hour for all stations, possibly from 6:30 a.m. to 6:30 p.m." He maintained that gasoline and oil consumption would not diminish nor would the public be inconvenienced by such shorter hours.

Now, Mr. Alexander writes:

"Our federal oil administrator has issued an order that might have accomplished exactly what I have always advocated for the industry, if he had not . . . so issued the order that it accomplishes little or nothing . . . in lower operating costs or less man-hours because . . . there is no uniformity in the opening and closing hours.

"In fact, in order to protect their own individual interests, most service station operators feel it necessary to keep their stations open about the same number of long hours . . . . except that now they are allowed to sell gasoline for only 72 hours per week. They are allowed to sell other merchandise and services for as many hours as they choose. There is no uniform opening and closing hours . . . which otherwise might have resulted in a huge economy . . . in fixed overhead such as heat, light, etc., and . . . manpower.

"If the oil administrator had put some teeth in this order and made the 72 hours of operation for all service stations on a uniform opening and closing basis of 12 hours per day maximum, 6 days per week applying to all stations alike . . . except at the so-called 24-hour stations that cater to commercial vehicles, a great help would have been given to the overworked and struggling gasoline station operators.

"It leaves me wondering," Mr. Alexander adds, "was the P.I.W.C. asleep in Washington when this order was being formulated, or were they alert but could find only a deaf ear . . . or could it be that the majority of P.I.W.C. members were in favor of such hours?"

Injury Frequency, Severity In Oil Industry Decline

NPN News Bureau

NEW YORK—Lower frequency and severity in injury rates during 1942 than during 1941 are shown for the petroleum industry in figures compiled by American Petroleum Institute's department of accident prevention. Improvement, as A.P.I. points out, is despite the disorganizing effects of wartime conditions and in contrast with the upward trend in accident rates for many industries.

Oil-company frequency rate for 1942 was 11.72, only 1.1% above the all-time low frequency figure of 11.59 reported for 1940. The 1942 severity rate of 1.31 was the lowest on record. The 104 fatalities and permanent total disabilities for 1942 were the equivalent of 31 per 100,000 employes, as compared with 33.9 per 100,000 reported for 1941, a decrease of 8.6%. Injury index is the frequency rate plus the severity rate per 10,000 hours worked. Frequency rate is the number of disabling injuries per 1,000,000 hours worked and severity rate is the number of days lost per 1000 hours worked.

Most notable improvement in 1942 is reflected in the ocean and coast-wise service of marine departments where the frequency of disabling injuries dropped to 16.76 in 1942 from 19.04 in 1941 and severity dropped to 2.02 in 1942 from 2.29 in 1941.

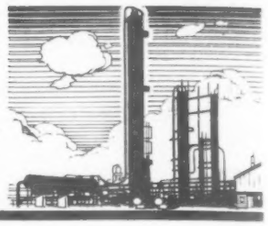
The 1942 report includes 180 oil companies employing 335,328 persons, which is 8 more companies and 2206 more employes than were included in the 1941 annual summary, A.P.I. stated.

Sunray, Superior Talk Merger

NPN News Bureau

TULSA—Discussions with a view to possible merger of Sunray Oil Corp. and Superior Oil Corp. (Del.) have been under way for some time. However, no concrete proposal has as yet developed.

C. H. Wright, president of Sunray, and Elmo Thompson, president of Superior, have been conferring with bankers representing each firm and it is estimated that the combined assets of the two units approximate $18,000,000.



100-Octane Shortage Described

Patterson Gives Figures at Truman Hearing, Says He and Jeffers to Tour Rubber, 100-Octane Plants Together. Ickes, Forrestal Testify

NPN News Bureau

WASHINGTON—Closer cooperation between the military and Rubber Director Jeffers in their battle for priorities—100-octane vs. synthetic rubber—was indicated May 3 by War Undersecretary Patterson before the Truman investigating committee.

"Jeff and I are going to take a trip," Mr. Patterson disclosed. "We are going to visit both rubber and 100-octane plants, and it is expected a great many bottlenecks will be broken as a result of the trip."

Judge Patterson disclosed also that Navy Undersecretary Forrestal will go with them.

Questioned as to who took the initiative in arranging the get-together, he or Mr. Jeffers, the war undersecretary replied "a mutual friend." He said arrangements had been made in the past few days.

Mr. Patterson thought the trip would be more effective in getting conflicting factions together than the proposal made earlier in the hearings of locking them in a room together to battle out their differences.

Low Plane Loss Hikes 'Gas' Need

Mr. Patterson's testimony was further highlighted by the disclosure that 100-octane requirements have been stepped up because our losses of planes in combat have been "less than half we expected".

"Our requirements in the past," he explained, "have taken into account the assumption that a certain percentage of planes will be lost in combat each month. The percentage is called the attrition rate.

"From combat experience, we are today finding that the percentage of planes actually lost in combat has been much lower than the anticipated percentage. In other words, our success in air combat has been much greater than we expected, with smaller losses of planes."

He said "this very success makes our job more difficult. We are going to have a bigger airforce sooner than we expected. To take advantage of this, and we must in a war which depends so much on air supremacy, will require larger amounts of 100-octane gasoline sooner than we expected."

Shortage of 100-octane in March, Mr. Patterson disclosed, had forced a cut in gasoline supplies for pilots in final training stage.

Some of the combat planes, which require 100-octane rather than 90-octane used in earlier training stages, had to be grounded, he said.

"In consequence, we were not able to train pilots and crews at the scheduled rate," Mr. Patterson said. "The shortage in April was larger and the losses in training were larger."

He offered to furnish the committee figures on this, in executive session, which "will convince you of the seriousness of the case".

Unless something is done, he said, "the shortages in the months to follow will result in even more serious consequences".

Mr. Patterson differed with WPB Chairman Nelson that grounding of training planes was due to "faulty distribution" of 100-octane rather than an overall shortage of 100-octane, saying Mr. Nelson "was mistaken".

"Right now," Mr. Patterson declared, "there is a serious shortage of 100-octane gasoline. Production is considerably less than requirements, and there are no stocks on hand in this country."

Gives Shortage by Months

Questioned by Chairman Truman, the undersecretary emphasized there are "no reserves in this country. We are on a hand-to-mouth basis".

"Let there be no mistake or misunderstanding about the reality of the shortage," Mr. Patterson declared. "The official report of the Petroleum Administrator for War, under date of April, 1943, shows a shortage for April of 30,000 barrels a day, for May a shortage of 44,000 barrels a day. For months, supply has been below requirements."

Mr. Patterson defended the Army estimates of future requirements, saying "a good job in stating requirements has been done, all things considered, even though the ultimate extent of our requirements was not realized a year ago."

He revealed that he had notified PAW "some weeks ago" that Army requirements for 100-octane would soon be revised upward.

Mr. Patterson acknowledged importance of the rubber program, saying, however, he did not believe it "as urgent a program for war purposes as the 100-octane gasoline program."

Rubber Better Off

"There is every indication," he continued, "that the rubber situation is in much better condition than the 100-octane gasoline. I take it that the recent relaxation of restrictions placed on use of rubber would not have come about if the rubber outlook had not improved to the point that any crisis in the supply has been passed. From present indications, there will be rubber but not enough 100-octane gasoline."

Judge Patterson stressed the need for building up supplies at overseas bases.

"There are long distances between the sources of production in this country and the points of consumption at the battle-fronts—distances that involve a trip of 6 months in some cases and a trip of 3 months in many cases," he said. "Remember that planes and crews sent to reinforce our forces overseas can, in 3 days of flying, get to combat areas which it will take 3 months by land and by water to supply with the fuel necessary to maintain those same planes and crews in combat.

"These long lines of supply by water are subject to interruption by hostile action. If adequate supplies are not maintained overseas, the sinking of tankers enroute to a theater could result in the grounding of planes in that theater.

"There is also the risk that part of the supply at the overseas bases will be destroyed by enemy air attack."

Sen. Tom Connally, Tex., remarked, "If it's a question of letting our people walk or letting our airmen fly, I say let them walk."

Mr. Patterson believed, from observations on a recent trip he made, that there will be a redoubling of efforts for production of 100-octane gasoline in the petroleum industry. He said the petroleum industry has shown a splendid spirit of cooperation "all the way through".

PAW Ickes, appearing before the Truman Committee April 28, took a crack at both the military and WPB for delays in aviation gasoline production.

Ickes Accuses Army

The Petroleum Administrator accused the Army of not making known its future needs far enough in advance to assure requirements being met on time. WPB's priorities he called little more than "hunting licenses"—papers that permit "you to go out and hunt for your materials and get them if you can find them".

Mr. Ickes, however, tempered his criticism of the military by explaining that 100-octane requirements changed so fast that "no one can predict how much we will need 6 months from now".

WPB's new method of "scheduling" component needs of the program, Mr. Ickes told the committee, will overcome many past difficulties of the priorities system. He asked for scheduling as far back as August, 1941, he said, and got it only a few weeks ago.

Mr. Ickes advocated a reappraisal of WPB Chairman Nelson's January decision stepping up rubber allocations to 55% of the program. Since then, the 100-octane and the rubber programs have been out of balance, with part of the rubber program holding the preferred position, he declared.

Navy Undersecretary Forrestal, before the committee April 28, said the Navy had not been "hampered for lack of 100-octane". WPB's December, 1942, directive giving rubber 20% of the program requirements, however, took enough valves from the Navy to outfit 100 escort vessels, he said.

Mr. Forrestal condemned overriding priorities and advocated "freezing" schedules so that once made up they cannot be changed in favor of other programs.

What's the Process? What's the Problem?

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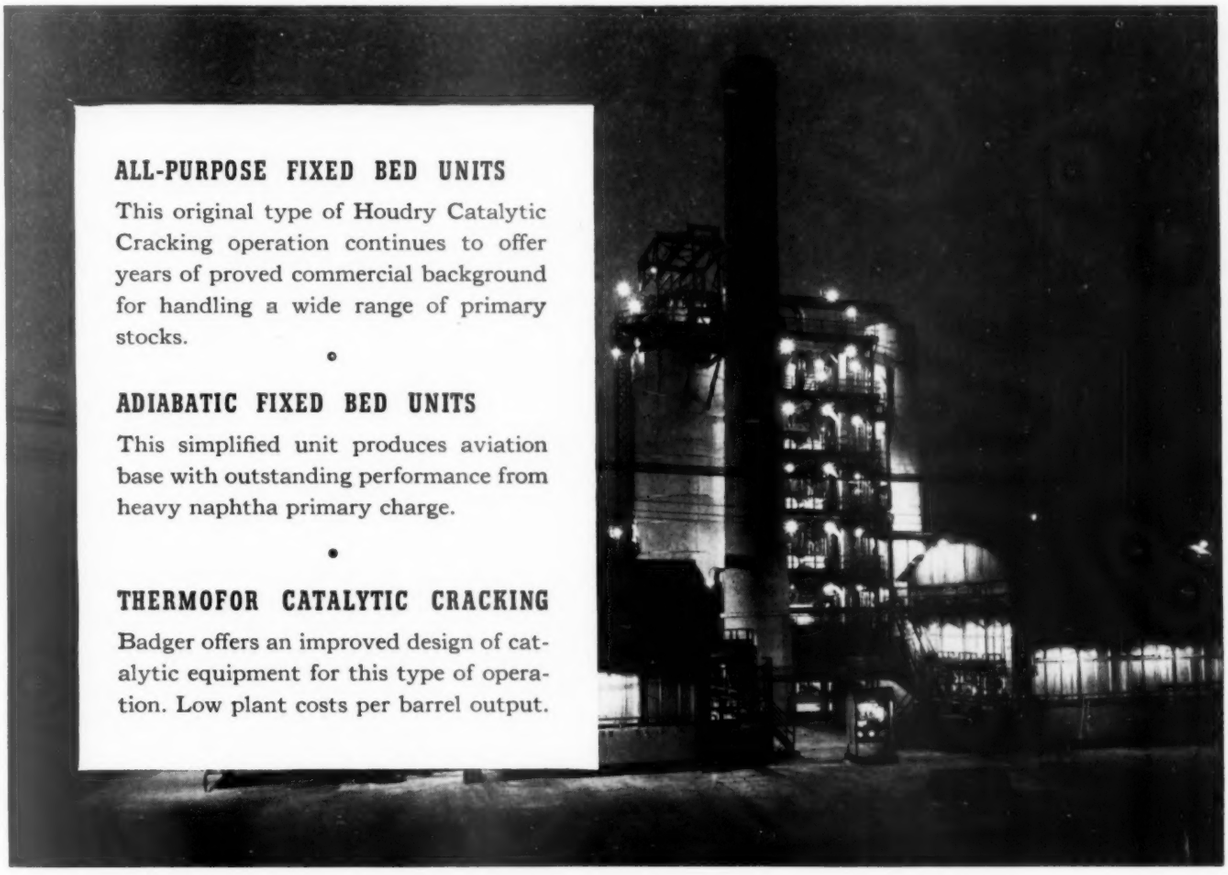

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Refinery Manpower

Job Definitions Pose Problem in Seeking Deferments. Committees Appointed to Compile 'Dictionary'. District 2 Hears Discussion by PAW Labor Expert

NPN News Bureau

CHICAGO—A subcommittee under the District 2 refining committee is being appointed to compile an "occupational dictionary" or classification of refinery jobs, which has been declared of primary importance in presenting a uniform schedule of deferments and replacements of refinery technical and operating men and others essential to the maintenance of wartime refinery operations.

George E. Dewey, PAW assistant labor counsellor, discussing manpower problems, at a District 2 refining committee meeting at the Blackstone Hotel here April 30, said that unless essentiality is proven to War Manpower Commission and Selective Service, 85% of refinery personnel between the ages of 18 and 38 will be drafted within the year. Only key men can be retained, he said.

A big flaw now is that the same refinery positions are listed under a variety of names on replacement schedules already filed by many plants. Result is confusion at Washington where WMC and Selective Service naturally cannot always properly classify employes unless the industry itself agrees on a uniform catalog or dictionary of position titles and duties coming under each.

First Problem to Define Jobs

Therefore, Mr. Dewey continued, the first problem of the industry is to get a list of job definitions based upon engineering standards. Lists are to be submitted by each of the PAW districts, then unified at headquarters in Washington, he said.

In preparing individual company replacement schedules, Mr. Dewey warned the refiners not to say that it takes 10 years to train a stillman merely because no one in their particular organization ever became a stillman in less than 10 years. Other similar examples were given.

"It depends upon whom you start with as to how long it takes to train an employe for any position," a refiner in the audience declared, "—a boy of 18 or a man of 45. A young man will catch on quicker—."

"Yes," interposed Mr. Dewey, "so far as the manual of duties is concerned, a young man can be trained in a short while, but the determination of real ability comes in the test of fire—the better judgment the older man would use to control it when the blaze breaks out."

"How about the seniority problem?" another refiner asked.

"Some sort of labor organization will have to be set up to take care of that," Mr. Dewey replied. "Meantime, the Labor Department at Washington has a method of taking care of it temporarily."

Rules on Women a Problem

During the discussion, it developed that several refiners either have trained or are training women for the physically lighter jobs that they can handle, although it was pointed out that regulations governing female employment varied in different states, particularly with reference to the number of working hours per day and weights to be lifted. Both of these, it was thought, could be changed to some extent to meet war conditions. Weights that may be lifted average about 30 lbs. for all states, it was believed, but some states now have maxima of 15 lbs.

In solving seniority problems, one refiner reported promotion of women ahead of men who are to leave soon for military service, satisfying the men by raising their pay to level of the higher job.

Companies who are ready to file replacement (deferment) schedules should go ahead and file, Mr. Dewey said. Job descriptions can be made uniform with the job dictionary later. Refiners who have applied to U. S. Employment Service bureaus or agencies for replacement employes, and have papers to show that they have been unable to obtain new help, naturally will be in stronger position on deferment requests, Mr. Dewey said.

Poses Labor Questions

Paul G. Blazer, Ashland, Ky., Ashland Refining Co. and refining committee chairman, said chemical engineers and other technical young men doing essential work can be deferred. "But," he added, "if you put the young man to sweeping the floor, you'll lose him."

However, it was pointed out that in small refineries the foreman may also be stillman, timekeeper and paymaster. The distinctions should be kept clear in the list of job definitions and the percentage of time spent at each shown on replacement schedules.

Labor troubles are inherent in job definitions, the refiners were cautioned, for if a man's title up-rates him, he will probably demand more pay; but good men entitled to promotion should not be held down or cannot be retained under WMC rules if higher salary with added responsibility is offered elsewhere.

Training of employes to man new plants is important, Mr. Dewey declared. He suggested that as soon as the plant foundation is laid, employes who are to be transferred there upon completion should be given a blue print and a part of each work day to walk over the plant and study the layout in order to be thoroughly familiar with it and ready to start operations immediately upon completion. This may mean an excess in number of employes temporarily, but meets with manpower regulations to hasten war plant production.

Up Louisiana Standard Contract

NPN News Bureau

WASHINGTON—RFC Chairman Jones announced May 1 that Defense Plant Corp., RFC subsidiary, has authorized an increase in its contract with Louisiana Standard to provide additional equipment for a plant in Louisiana, at a cost of approximately $440,000, resulting in an overall commitment of about $9,500,000. Louisiana Standard will operate the facilities, title remaining in DPC.

LOS ANGELES—Address of the Independent Refiners' Assn. of California has been changed to Suite 655 Subway Terminal Bldg., 417 South Hill St., Los Angeles, Cal.

Navy Seeks Oil Experts For Officerships

NPN News Bureau

NEW YORK — Need for men who can qualify as officers under the Navy's Petroleum Specialist program is revealed in a Navy announcement that commissions still are available for qualified men.

Successful candidates, according to the announcement, "will devote their attention to problems related to the inspection of and need for petroleum, as well as those which arise in relation to the operation of refineries. The duties of officers appointed under this program will, in addition, extend to preventive maintenance, the application of petroleum products and the development of new products."

To qualify for such a commission, applicants should hold a degree in petroleum or chemical engineering, although 10 years' experience in a responsible position in the oil refinery field or in laboratory work in connection with fuel oil or its derivatives will be considered as the equivalent of a degree. Applicants also should have at least 2 years actual refinery experience in the analysis of petroleum products, but those of exceptional ability with less experience will be considered. Candidates should be 23 to 45 years old, must meet Naval physical requirements and possess officer-like qualities.

Application should be made to the nearest Office of Naval Procurement, located in principal cities throughout the U. S.

Atlantic Announces Operation Of New High Octane Unit

Special to NPN

PHILADELPHIA—A new aviation gasoline unit has been placed in operation by Atlantic Refining Co. at its Point Breeze refinery, E. J. Henry, vice-president and general manager of refineries for the company, announced here May 1.

In making the announcement, Mr. Henry said the company began operation of the plant at the earliest possible moment, using an elaborate pilot unit to avoid operating difficulties which usually retard efficent operation of new plants. Test operation of the plant for the past month has proven highly satisfactory, he said. He added that Atlantic has a staff of operators "trained especially for this process" and in describing the size said over 20,000 gal. per minute of hydrocarbons and catalyst circulated through the unit.

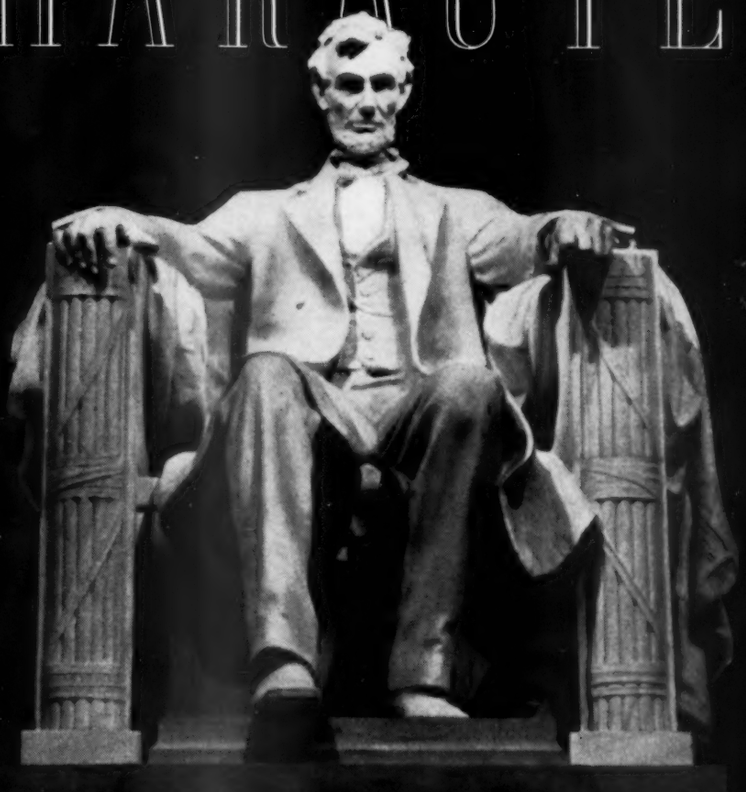
Phillips Reports Approval Of Cycloversion Plant

Special to NPN

BARTLESVILLE—Phillips Petroleum Co. has received government approval for the construction of a large cycloversion plant which will produce special ingredients of high-octane aviation gasoline, Phillips reports to stockholders.

The company's hydrofluoric acid alkylation plant is now producing far in excess of designed capacity, its report stated. Plans for the enlargement of this plant are being prepared and a second such plant is already under construction at another location.

CHARACTER



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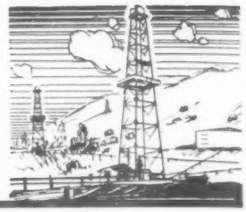
Photograph courtesy T.V.A.



Producers Study War Problems

Manpower and Materials Principal Topics at A.P.I. Southwestern Production Division Meeting. Harbison, Other Officials Address Session

Special to NPN

HOUSTON—Two of the oil industry's most pressing wartime problems, materials and manpower, were discussed here this week at the annual spring conference of the southwestern district of the American Petroleum Institute's division of production.

Dr. F. H. Harbison, PAW labor counsellor, warned oil men that unless immediate action was taken in the manpower situation the oil industry will have trouble meeting production schedules. This includes the output of aviation gasoline, toluene and synthetic rubber as well as crude oil, Dr. Harbison said.

Name Manpower Groups

At the same time the general committee for District 3 announced it has instructed the production, refining, natural gas and natural gasoline and transportation committees to appoint special technical subcommittees on manpower.

"These subcommittees will be charged with the responsibility of recommending programs for use of manning tables and replacement schedules by the various branches of the petroleum industry," the general committee announced.

Dr. Harbison said although the oil industry was tackling its manpower problem later than other industries he thought the problem would be met successfully. He said because of the manpower shortage women would be employed in all refineries before the war is over. He cited one case where 27% of the employes of a refinery are women.

To Handle Locally

Dr. Harbison also pointed out that all manpower problems in the oil industry were either local or regional and that the problems would be dealt with locally and not nationally.

Henry LeBlanc, acting regional director of the War Manpower commission, told oil men the manpower commission and those charged with the administration of its policies and regulations are fully aware that the finding, producing and refining of oil will continue to rank in essentiality with food, transportation, ammunition, guns, tanks and planes.

However, he warned that the oil industry was confronted with the certainty of additional heavy demands upon its labor force. He said the sudden upswing of industrial war production volume in the southwest has created a real manpower problem.

J. R. D. Eddy of Austin, director of vocational training, state board of education, urged oil companies to establish an effective training program that will provide trained supervisory personnel and trained employes.

Effort is being made by the producing division of the A.P.I. to obtain recognition by the War Production Board of the standardization program for oil field equipment which has been an A.P.I. project for more than 20 years.

An appraisal of the A.P.I. standardization program was given by J. F. Lucey of Dallas.

D. G. Hawthorn of Washington, chief of the equipment section of PAW's production division, outlined the government's newly inaugurated Controlled Materials Plan.

He said a plan is under study to require larger oil operators to anticipate their needs of all tubular goods.

The classification of "large operator" would include anyone drilling more than 40,000 ft. of hole in 1942.

"The Controlled Materials Plan marks an important step in the smooth flow and equitable distribution of materials and upon this foundation a workable system of material control can be built," Mr. Hawthorn said.

Operation of the War Emergency Pipe Line projects, together with further improvements in industry-owned lines, should raise the total deliveries of petroleum and petroleum products to District 1 by inland and overland carriers to more than 1,600,000 b/d by the end of this year, T. E. Swigart, president of the Shell Pipe Line Corp., told the oil men.

Sees 600,000 B/D by Pipeline

"Increasing from a nominal daily amount of about 45,000 bbls. of crude in 1941, pipeline deliveries of crude and products into District 1 will reach 500,000 bbls. by the end of 1943," Mr. Swigart said. "Upon completion of the War Emergency 20-in. line, they should exceed 600,000 b/d."

D. V. Carter of Dallas, Magnolia Petroleum Co., was elected chairman of the southwestern district succeeding R. O. Garrett, Shreveport, United Gas Pipe Line Co.

Photographed at the spring meeting of the southwestern district of A.P.I.'s production division were (left to right): R. O. Garrett, Shreveport, Arkansas Fuel Oil Co., retiring chairman of the southwestern district; A. W. Baucum, Houston, The Texas Co., chairman of the Houston Chapter of A.P.I.; Kraus Earhart, Houston, director of PAW's facilities security division, District 3; Carl A. Young, Dallas, secretary of the production division of A.P.I.; and David G. Hawthorn, Washington, chief of the equipment section, PAW production division. Meeting was held in Houston

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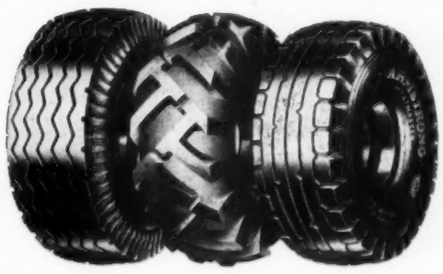

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Oil TRANSPORTATION

Local Deliveries: Ready for Cut

ODT Order Regulating Local Deliveries Ready for Issuance. Larger Dumps, Fewer Calls is Aim. NPN Gives Preview of New Requirements

NPN Staff Special

WASHINGTON—Within the next few days ODT plans to issue its order regulating local tank truck delivery of petroleum products.

Aim of the order is to improve efficiency in the use of equipment and to save on manpower. It was worked out with PAW, industry representatives, and ODT's petroleum advisory committees on local delivery.

Savings in mileage and manpower result principally from the order's 3 most important requirements—minimum dumps of motor fuel; full load dispatching; and prohibition on use of trucks to make calls for any purpose other than loading or delivery of petroleum liquids in bulk. Call-backs are prohibited unless they empty the truck or are made in conjunction with the delivery of other motor fuel or fuel oil.

What Order Will Do

In effect, the restrictions on calls stop practices such as special trips to deliver service station supplies and the use of trucks to collect coupons or money or to solicit business.

Small deliveries of fuel directly into the fuel tanks of vehicles and equipment are ended by the minimum dump requirements.

Trucks may be used to make calls for pumping out a tank in cases where the wrong product has been delivered, or to service, maintain or repair a tank truck and may deliver service station supplies in conjunction with deliveries of petroleum liquids complying with the full-load and minimum dump requirements.

Specifically, the order provides that all tank trucks used in making less-than-truckload deliveries of fuel oil or motor oil be dispatched with a full load and routed in a manner that best conserves mileage and time. To accommodate the full load requirement, it further provides that no one, regardless of any agreement or contract, shall be required to make any less-than-truckload delivery in less than 48 hours of receipt of order. No minimum dump on fuel oil is required.

Order stipulates minimum drops for less-than-truckload deliveries of motor fuel to 3 groups of users into which motor fuel receivers are classified: namely, retail outlets, bulk consumers, and farms.

3 Classes Specified

The minimum drops specified to the 3 classes of receivers are: to a retail outlet, a quantity amounting to at least 60% of the storage capacity in use at that outlet for the particular grade of brand being delivered; to a bulk consumer, the same percentage of storage capacity, with a 150-gal. minimum; to a farm, either the same percentage of storage capacity or the quantity required to fill the storage receptacle but with a 25-gal. minimum under either alternative unless the quantity of all petroleum liquids being delivered at the time adds up to 50 gal. or more.

If the total delivery to a farm comes to 50 gal. or more, there is no minimum dump required on any particular product; nor in any case, regardless of the farm storage capacity, is a single delivery of more than 150 gal. required. ODT points out, however, that 150 gal. is not to be construed as a limitation and urges that farm users take deliveries of as large quantities as facilities permit.

Order defines a farm as any tract of land approximately 3 acres or more of which are used for agricultural purposes or for the breeding and raising of livestock, poultry, or bees.

In case of delivery by compartment lots, the minimum dump to all three classes of receivers is the quantity less than the stipulated minimum but nearest to it that can be attained by completely emptying one or more compartments.

Only when a call empties a truck or when other petroleum liquids are delivered in accordance with the prescribed requirements, is the minimum dump cancelled.

By the order's definition, fuel oil means any liquid petroleum product commonly known as fuel oil, including grades known as Nos. 1, 2, 3, 4, 5 and 6, Bunker C, diesel oil, diesel fuel, kerosine (variously known range oil, stove oil and coal oil) or any liquid petroleum product *except* liquefied petroleum gas, used for the same purposes as the above named kinds or grades.

Motor fuel means any liquid fuel of any kind commonly used in motor vehicles or motorboats and subject to federal government gasoline taxes except diesel oil, diesel fuel, benzene, benzol, naphtha, liquefied petroleum gas, natural gasoline, aircraft fuel, kerosine under its various names and other light distillates used in farm tractors and farm machinery.

Exceptions in the definitions of fuel oil and motor fuel release trucks carrying liquefied petroleum gas from both the full load and minimum dump requirements. Trucks carrying fuels excepted in the definition of motor fuel are free from the minimum dump requirements but may not be dispatched without a full load. All trucks are subject to the restrictions on call-backs and use for purposes other than loading or delivery of petroleum liquids in bulk.

Terms of the order provide for exemptions or exceptions to cover possible emergencies, avoid conflict with inventory restrictions incidental to PAW allocations, and prevent discrimination among customers.

South Carolina Bases Tank Truck Limit On Gallons Carried

Special to NPN

SPARTANBURG, S. C.—Action of Gov. Johnston in allowing trucks to haul a full load—up to 4300 gal.—of fuel oil, kerosine or gasoline over South Carolina highways was highly praised by L. A. Odom, Spartanburg oil jobber, who heads War Emergency Cooperative Assn., a 4-state, for-hire oil trucking organization.

"This is a great relief to truckers with movements in and through South Carolina," said Mr. Odom, commenting on Gov. Johnston's proclamation of April 30 allowing a heavier loading of transport trucks. "In my opinion, this is a very important step forward for petroleum truck transportation in the present emergency."

Under the gross weight law of South Carolina, tank trucks could haul a maximum of 4300 gal. of gasoline. However, the same transports could not load to full capacity with fuel oil or kerosine without exceeding the 40,000-lb. weight limit. Now, Gov. Johnston has remedied this by putting the maximum limit on a gallonage basis—4300 gal.

Replacement Parts

You Don't Need a Priority, but You'll Have to Shop Around. WPB Gives Steps

NPN News Bureau

WASHINGTON—The procedure to be followed in obtaining replacement parts for trucks was outlined April 29 by R. L. Vaniman, WPB's automotive division director.

He pointed out that owners of automotive vehicles cannot, of course, expect the service and facilities of pre war days. They may not be able to find the parts needed in the first repair shop or in the shop that usually does their repair work. So they must learn to do more for themselves.

"The owner who accepts the statement of the first parts dealer he approaches that 'you can't get that part any more' and lays up a truck performing essential services without further effort to obtain the part is impeding his country's war effort," Mr. Vaniman said.

Don't Need Priority

Many owners, according to Mr. Vaniman, labor under the misunderstanding that they must have a preference rating to buy a replacement part. "Owners of automotive vehicles, and this includes owners of truck fleets and transportation buses, can get their replacement parts without preference rating, and they should not be asked for such ratings when the parts are to be used for repair," he said.

Possible steps to be followed by owners of

READY AND WAITING FOR *"the plane of the future"*

Aircraft engine designers can now start with a clean sheet of paper. They can unshackle their imaginations.

For the first time, they need not compromise their designs according to fuel limitations. The new Houdry Adiabatic Process makes possible a super-aviation fuel so vastly better that engines of current design cannot fully use its capabilities. New designs will have to be created —not only for engines, but for aircraft that can withstand the strain of multiplied power and speed.

Improved Performance for Present Planes

Until these super-aircraft are designed and built, this super-fuel will be important principally as a "blending agent" by which present aviation gasolines may be raised in quality. Even when used in this manner, it will result in greatly improved performance for aircraft of current design.

A semi-commercial plant is now producing super-aviation gas by the new Houdry Adiabatic process. Its entire production is reserved for testing by the armed forces and Houdry technicians. For military reasons, full details of the operation of this plant, and of the process itself, cannot be published. However, inquiries from qualified sources are invited and will be satisfied to whatever extent may be permitted by government authorities.

Houdry Plants Make 90% of America's Catalytically Cracked Aviation Gas

The new Houdry Adiabatic Process is the most recent development of Houdry research in the field of catalytic cracking. Houdry plants last year produced more than 90% of all the catalytically cracked aviation gas in the world. *Better* gasoline, by the way, than is made by any other "cat crackers" in existence!

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vehicles in buying repair parts were given as follows:

1—The repair man must first determine whether or not the old part can be repaired or reconditioned. If it cannot, the owner is eligible to purchase a new part.

2—Where the owner is unable to get a new part from local distributors or a serviceable used part from an automotive scrap yard—and in this effort he may secure the help of the nearest district ODT office—he or his repair man places a purchase order with a dealer.

3—The dealer, in turn, transmits the purchase order to the manufacturer, with or without a "Certificate of Emergency," according to the essentiality of the need.

4—Finally, if the manufacturer is unable to supply the necessary part, the dealer or the repair man may appeal for assistance to the nearest district or regional war agency office that has on its staff an automotive specialist representing the automotive division of WPB.

The first three ways, Mr. Vaniman said should be tried before asking WPB for assistance.

What to Tell WPB

Requests to WPB should give the following information: Description and quantity of parts needed; catalog number; where purchase order was placed, and any identifying number on it. These details will assure proper identification of the purchase order and the part or parts needed.

The owner is expected to turn over to his repair man the broken or worn part for which a replacement has been obtained. The repair man in turn passes on the old part to the dealer or manufacturer if it can be rebuilt; otherwise he scraps it.

Ethyl Offers Maintenance Plan For Owner of One Truck

NPN News Bureau

NEW YORK, N. Y.—A big fleet maintenance program tailored to fit the needs of the one-truck owner has been developed by Ethyl Corp. for the use of oil companies and independent oil jobbers.

Ethyl Corp. reports this market as consisting of 1,040,000 farm trucks and 2,900,000 "small business" trucks. "This market can be reached *only* through garage and key service station outlets . . . ." says the prospectus which outlines the Preventive Maintenance Control Plan.

The program grows out of the company's experience with truck and bus operators on problems related to efficient use of fuels and from a simplified preventive maintenance system developed for enlisted Army men who are not trained maintenance mechanics.

Aim of the plan, offered oil marketing companies, is to reach the small business truck market and to relieve manpower shortages and "green" help at service stations by putting small truck maintenance on a periodic basis. One of Ethyl's preventive maintenance kits has been sent to each of its customers along with a price list. Some of the material is free, other of it sells for a nominal amount.

The program is designed to supplement an oil company's own truck conservation plan, to supplement ODT's Truck Conservation Corps, or to be a complete program by itself

Trucks Take Over

By Relieving Short-Haul Rail Movement Tank Trucks have Released 14,000 Tank Cars, Eastman Says, but Trend Must be Pushed. ODT Plans Action

NPN News Bureau

WASHINGTON—A striking illustration of how trucks are being utilized where they are more efficient than railroads is in the case of petroleum products, ODT Director Eastman told the U. S. Chamber of Commerce April 28 in New York City.

He revealed that over 14,000 tank cars have been released for long-haul service to the East Coast by substitution of tank trucks on short hauls.

He also had praise for substitute means of oil transportation.

Our domestic transportation in this time of dire need, Mr. Eastman said, has thus far been guilty of no failure in performance, with the qualification that the railroads, the pipelines, and the waterways have not been wholly able to take the place of the ocean tankers in supplying the enormous demands of the East Coast for oil.

"What they have done, however, in taking over this great task, for which they were neither organized nor well equipped, has been to their glory rather than their shame."

Cites Trainload Movement

In his speech, Mr. Eastman also made special mention of rail hauls of oil from the southwestern producing areas and from the "big inch" pipeline terminal at Norris City, Ill., to the Eastern seaboard.

"This movement," he pointed out, "has been highly organized into the operation of through scheduled 'symbol' trains in both directions, with close supervision at interchange points and important terminals. It is being conducted as though the participating railroads were a single system."

He mentioned also the effective plan under which shipments to ports for movement overseas are controlled so that they do not congest facilities, and the constant control over the general storage situation to take care of what is, for the time being, surplus production. This has kept it from bogging down on transportation.

Although many tank car hauls have been switched to trucks, ODT is planning even greater rail-truck coordination. Appeals—if not orders—may soon go out nationwide for stepping up diversion of this short-haul traffic from tank cars to tank trucks.

Dow Writes Chicago Supplier

As a first move in this direction, ODT Petroleum Transport Director Dow has written bulk suppliers in the Chicago switching district to arrange with receivers to prepare for round-the-clock receiving of tank truck deliveries.

ODT predicted, in announcing Mr. Dow's letter, that mounting tank car requirements of the armed forces and anticipated diversion of tank cars now tied up in the Chicago switching district to long haul west-east service will require tank truck substitution in that area.

Mr. Dow urged large residual and distillate users, who lack tank truck roadways and pumping facilities, to install them "without delay".

Plan Naming Liberty Ships After Pioneer Oil Men

Special to NPN

OLEAN, N. Y.—The suggestion of John P. Herrick that oil industry pioneers be honored by giving their names to U.S. ships built during the war has received favorable response from the U.S. Maritime Commission. Mr. Herrick has been notified that the names of Col. Edwin L. Drake and Orville P. Taylor are now on the list from which the names of Liberty ships are drawn.

A retired oil man and newspaper publisher, Mr. Herrick first wrote Secretary of the Navy Knox suggesting that pioneer oil men be honored by having their names placed on warships, specifically proposing Drake and Taylor. Navy's time-honored naming procedure prevented this, however, since the prescribed qualifications largely restrict the list to Navy personages. But Col. Knox found the suggestion of merit, and referred it to the Maritime Commission.

In suggesting Orville Taylor, Mr. Herrick pointed out it was he who completed Triangle No. 1 at Petrolia in June, 1879.

Rail Hauls to East Dip in Week Ended April 24

NPN News Bureau

WASHINGTON—Rail hauls of crude and products to the East Coast averaged 939,853 b/d during the week ended April 24, with tank-cars accounting for 922,870 b/d and box cars of drummed kerosine to New England accounting for 16,983 b/d, PAW reported April 29. Previous week's shipments were 943,055 b/d by tank car and 20,588 b/d by box car.

Total of 44 participating companies loaded 29,770 tank cars during the week ended April 24 as follows:

Company	Cars	Company	Cars	Company	Cars
Allied	57	Frontier Oil	69	Sinclair	2238
American Bitumuls	80	Gulf	3239	Shotmeyer	3
Amsco	276	Hartol	222	Socony-Vacuum	2672
Arkansas Fuel Oil	71	Hess, Inc.	35	Southland	21
Ashland Refining	110	Home Oil	15	Southport	134
Asiatic	63	Old Dutch	3	Southwestern	93
Atlantic Refining	2505	Pan American	1668	S. O. California	19
Bell Oil & Gas	16	Petrol Corp.	292	S. O. Kentucky	66
James B. Berry Sons	13	Petroleum Heat & Power	66	S. O. New Jersey	5714
Chalmette	37	Phillips	185	S. O. Ohio	50
Cities Service	1441	Pure	242	Sun	2696
Conoco	298	Republic	12	Talco	47
Crown Central	2	Roosevelt Oil	1	Texaco	2143
Elk Refining	22	Royal	98	Tide Water	1380
Freedom Oil	1	Shell	1228	"Miscellaneous"	127

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SHELL DEVELOPMENT COMPANY

$93,000,000 Worth of Highway

For Defense Today, for Pleasure Tomorrow—New Roadways Will Link Atlantic Seaboard with Panama Canal via Mexico and Central America

Tremendous impetus to post-war tourist travel from the U. S. to Mexico and Central America is foreseen in the $93,000,000 worth of roads now being rushed to completion in those countries to help hemisphere defense and to carry food and vital war supplies.

The Jones family can take a little longer vacation than usal after the war and drive from their native Iowa, for instance, down to Honduras. The Brown family, on the other hand, may visit relatives in Alaska, making the entire trip in the family car over the new Alcan Highway. This 1600-mile road running up through Canada, coupled with the inter-American roadway, will provide automobile travel for 8000 miles from Alaska to the Panama Canal—and then beyond. The cost of the Alcan Highway is not included in the $93,000,000 figure given for roadbuilding in Mexico and Central America.

Edwin W. James, chief of the Inter-American Regional Office, Public Roads Administration, sees the Pan American Highway of vital war significance and likewise an important factor in peacetime.

Promotes Neighborliness

In an article distributed by the American Road Builders Assn., Washington, Mr. James calls expenditures of $35,000,000 by the U. S. in Central America and $10,000,000 by the republics themselves warranted because of the strategic importance of the highways to the war effort as well as promotion of the good neighbor policy.

"In Panama, for instance," Mr. James says, "there is a food problem because of the concentration of defense forces there and the shipping bottleneck. Yet nearby Costa Rica is a potential source of additional food.

"The U. S. has entered into an agreement with Costa Rica for increased production of foodstuffs. Highways will facilitate the movement of this food and local self-sufficiency in wartime.

"Today, roadbuilding in Central America serves more than an immediate strategic defense purpose. Central American economy has been dependent in large part upon exports of bananas, coffee, and other commodities. Export markets have been curtailed or eliminated by scarcity of shipping. New road building is a handy outlet for displaced workers. In Honduras, thousands of banana workers were left idle by cessation of banana exports. To provide emergency employment and improve highway transportation, the U. S. made funds available for the rebuilding of a section of the highway from Potrerillos to Tegucigalpa.

Stresses Economic Value

Stressing the economic value of such highways, not only in promoting domestic trade in these republics, but in relieving their dependence upon the hazards of wartime water shipping, Mr. James says:

"Highways should improve internal trade in Central American countries and lessen their economic dependence upon overseas communications. In wartime, greater self-sufficiency . . . must be attained. The Central American countries realize this. So do the U. S. authorities. From this mutual understanding of common problems results co-operative efforts to help tide Central America over wartime supply problems.

"The economics of Central America," Mr. James continues, "like those of South America, have been tied into the world market. Central America's chief market has been the U. S. In turn, Central America has depended mainly upon the U. S. for manufactured goods and in some cases for food, too."

Thus, a "pioneer" road of 625 miles to close the gaps in the Inter-American highway now reaching from the Atlantic Seaboard to a point 150 miles south of Mexico City, is being built through Central America. It will provide continuous overland transportation to the Panama Canal, linking with the railroads of El Salvador, Guatemala and Mexico. "Trucks on this highway", Mr. James adds "would carry coffee as well as other commodities to shipping points."

Highway Is Avenue

He warns Mexican railways will be heavily laden with strategic materials for U. S. industry, "but the Inter-American highway may provide an avenue for the movement of many things north and south, including some coffee."

Holding out the hope that after the war the highway will become one of the strongest bonds uniting the American republics in interchange of trade, culture and ideals, he adds:

"When the Pan American Highway system was started 19 years ago, one of its great attractions was the prospect for tourist travel between the Americas. We saw the lure of such travel when the highway from the U. S. to Mexico City was completed (in 1935).

"This tourist travel was an effective method of making good neighbors acquainted with one another. After the war, the tourist urge will revive. The new Inter-American roadway will be useful when the peoples of the Americas resume peacetime travel."

Supplementing U. S. expenditures for these highways, Mexico, through credits from the Export-Import Bank of Washington, is spending $30,000,000 to complete the southern end of the Inter-American highway through that country. Panama is completing roads costing $10,000,000 hooking up with the highway. Nicaragua has just spent $2,000,000 and is starting on a $4,000,000 project, while Honduras, El Salvador and Costa Rica will spend over $2,000,000.

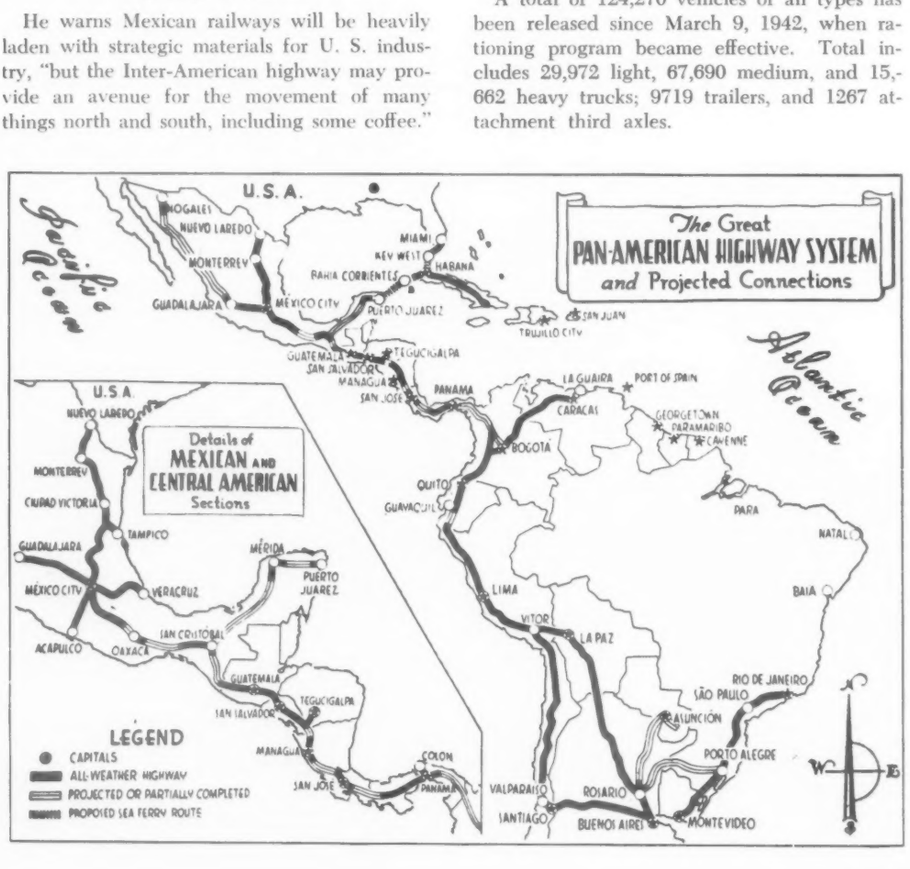
Truck Rationing Figures Given

NPN News Bureau

WASHINGTON—A total of 1547 vehicles were released under the truck rationing program during week ended April 24, WPB announced April 28.

Civilian users and holders of Government Exemption Permits received 264 light, 1027 medium, and 36 heavy trucks; 194 trailers, and 26 attachment third axles.

A total of 124,270 vehicles of all types has been released since March 9, 1942, when rationing program became effective. Total includes 29,972 light, 67,690 medium, and 15,662 heavy trucks; 9719 trailers, and 1267 attachment third axles.



Oil's Mid-Western Nerve Center

That's PAW's District 2 Office in Chicago. Meet its Top-Flight Executives

PAW'S District 2 director-in-charge, Wirt Franklin (center), who is also District 2 PAW director of production, calls in his two able assistants on a knotty problem. At left is Harold L. Wadsworth, assistant director-in-charge; at right is C. C. Brown, assistant director of production

THERE are good reasons why the District 2 office in Chicago of the Petroleum Administration for War is one of the busiest places in the country.

Boundary lines of the district circle the heart of the great Mid-West, taking in 15 states, 36.6% of the nation's population, 40.4% of its passenger cars, 37.1% of its heavy trucks and buses and 66.6% of its tractors. The people of Oklahoma, Kansas, Nebraska, North and South Dakota, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Tennessee, Kentucky, Indiana, Ohio and Michigan are engaged in enormous war production, military establishments, diversified manufacturing industries, mining, timber and oil operations and they till, largely by machinery, a vast area of level farm land which has served America's larder for many years and which now is expected to help feed the world.

Adds Up to Headache

All of this adds up to demands for a tremendous gallonage of petroleum products (39.9% of the nation's gasoline consumption, for example) and it also adds up to headaches for the men who are coordinating the efforts of the mid-western petroleum industry under the most difficult period of operation in oil's history.

Transportation problems, materials problems, manpower problems, supply problems—these are the main difficulties harassing the industry today. The oil industry in the Mid-West has its adequate share.

Handling these mid-western problems is a PAW organization in Chicago which occupies one and a half floors of office space in the Shell Building at 624 South Michigan, facing, across a beautiful parkway, the clear, cool water of Lake Michigan. There are 135 employes in the office.

Pause at Blackstone

Before we meet the top-flight members of the staff, let's pause a moment at the nearby Blackstone Hotel. Over 300 oil men from all over the district serve on more than 30 industry committees in the Mil-West; they come to Chicago frequently, many stop at the Blackstone and many committee meetings and conferences are held there. Right at the moment, a state legislative committee is holding a hearing there on fuel oil rationing.

'Misunderstanding Somewhere'

A dozen men are seated around a long table, with as many more either standing or occupying chairs nearby in the committee room. Some angry moments have passed. State Sen. Earl B. Search, head of the investigating committee, has a typewritten complaint before him. It is from an oil operator in southern Illinois, where quantities of fuel oil originate. Wirt Franklin, district director of production and director-in-charge of PAW's District 2 office, had stopped the complainant's drilling operations pending adjustment to meet regulations. The complaint being heard didn't sound just right to Mr. Franklin, but he listened attentively.

"Now, I'm glad you brought that up," he said when Sen. Search had finished. "There's a gross misunderstanding somewhere and I want to clear it up."

"All right, let's have it," said Sen. Search.

"Facts of the case are . . . ." Mr. Franklin began, and proceeded to analyze the situation. He explained that Mr.————, the independent oil operator from southern Illinois, had visited his office, they had discussed the drilling regulations, and Mr.———— had gone away satisfied.

The comments and patient explanation in detail are typical of Mr. Franklin. "Wirt", as the oil industry intimately knows him, is not only "PAW" to the industry in the Mid-West, but years ago he fostered oil conservation in Oklahoma, along with many other civic and industry-minded ideas, before, during and since the organization of the Independent Petroleum Assn. of America at Colorado Springs in 1929. He was president of the association from its start until he declined re-election in November, 1935.

Native of Missouri

He is a native of the Land of Big-Eared Mules and back of his natural courtesy and patience is the necessary mental muscle to enforce regulations when the going gets rough.

Born at Richmond, Mo., in 1883, he grew up at Macomb and Lacon, Ill., and graduated from Lacon high school. He attended law school at what is now George Washington University at Washington, D. C.

Problems of the Red Man became familiar to him when he served as stenographer with the House Committee on Indian Affairs in Washington from 1900 to 1902 and with the Dawes Commission at Muskogee in the old Indian Territory from 1902 to 1905.

As law clerk, he had charge of preparation of the Choctaw and Chickasaw rolls, later the basis for allottment of lands to those Indian tribes.

Moving to Ardmore, Okla., his present home, in 1906, Mr. Franklin ventured into the oil business with his law partner, S. A. Apple,

Carroll W. Johnson (center), heads oil marketing in PAW's District 2 office, assisted by E. L. Hughes (right), chief of the fuel oil section. At left is E. F. Underwood who headed the facilities section of the District 2 marketing division until taking leave to return to Skelly Oil Co.

District 2 acting director of transportation is Paul Bond (left), also director of supply under PAW Directive 65. Photographed with him are (left to right): Walter Dumont, District 2 transportation director now on leave, and Loyal B. Holland, District 2 materials division director, PAW

who with Ed Galt and Roy M. Johnson formed the Crystal Oil Co. The Healdton field in southern Oklahoma had just been discovered. Successful, the company was sold in 1916 for $2,000,000.

The Apple-Franklin Oil Co. was also organized in this period, and Mr. Franklin next operated independently until organizing Wirt Franklin Petroleum Corp. in 1927. The company was disposed of 10 years later.

Active in Oil Organizations

With wide industrial, social and fraternal interests, Wirt Franklin is a director of A.P.I. and of the Kansas-Oklahoma Division, Mid-Continent Oil and Gas Assn. At Ardmore he is a charter member and former president of the Lions Club, and of the Dornick Hills Country Club.

While president of the Independent Petroleum Assn. he was instrumental in obtaining a tariff on oil products, resulting in limitation of imports, then over-plentiful. Many other moves for protection of the independent oil producer were also achieved.

He joined OPC (now PAW) in August, 1941, and took District 2 with its 15 western states in charge.

Problems were—and still are—numerous and none of them are simple, so Harold L. Wadsworth occupies the adjoining office as assistant director for District 2.

Wadsworth from Detroit

Mr. Wadsworth marked himself an oil man the instant he mentioned his business travels—Wyoming, Oklahoma, Texas, Montana, Michigan and Illinois. Jeeps, peeps, tanks and Harold L. Wadsworth come from Detroit where they used to make automobiles for peacetime consumption of the products of the oil man.

Mr. Wadsworth was graduated from Yale's Sheffield Scientific School in 1914 and served in World War I for 19 months. Entering the Navy as a seaman, he emerged as ensign. With a salty stride he swung into the oil business as treasurer of the Lewiston Oil & Refining Corp., Lewiston, Wyo.

"Since then," he says,"I've been fussing around in the oil business entirely as an independent."

He was financially interested in drilling one of the deepest cable-tool wells in the United States in 1929-30 at Badger Basin, Wyo. "The hole was drilled by Resolute Oil Co. to a depth of 8500 ft., if my memory serves me." He paused and looked toward the door.

Mrs. Jessie Moon, PAW receptionist, entered and handed "Waddy"—that's what everyone calls him—a memo about an operator who wanted to see him about drilling a wildcat.

Johnson Heads Marketing

Probably the hottest subject in the Mid-West is marketing, but Carroll W. Johnson, PAW's marketing director for the area, is accustomed to hot subjects. He was in Honolulu on Dec. 7 as Hawaiian division manager for Shell Oil and knows the Japs are no one-finger push-over. But that's another story. He stayed 6 months after the Pearl Harbor raid, then joined PAW in Chicago.

He is a student of economics and got his first real opportunity for practical study when he started with Shell Oil in San Francisco 18 years ago, soon stepping up from clerk to local manager, district manager, and division manager. It was in 1940 that he was transferred to Honolulu as division manager. Water sports—in fact, all outdoor sports including boxing—interest him. The phone rang and 3 people wanted to see him.

Only a step across the hall is the office where E. F. ("Tex") Underwood, chief of the facilities section of the marketing department and now on leave of absence, hung his hat. Mr. Underwood has returned to his job as sales manager for Skelly Oil at Kansas City, but the day we visited him he was listening intently to a big man with a thick, ruddy neck complain about the intricacies of Maximum Price Regulation No. 323 on asphalt.

At the sound of feet on the hall carpet, Mr. Underwood glanced up with a "Just a minute, please" look. A vacant chair was nearby.

"That's an OPA regulation," he said to the man with the ruddy neck, "but if I can assist. . . ."

Mr. Underwood joined PAW in November, 1942. He's been with Skelly for 17 years. Before that he drove a span of mules hitched to a 250-gal. tank wagon belonging to The Texas Co. He served overseas with the Marines in the first World War.

Asphalt was only one of the things he looked after while with PAW. He also developed surveys and worked with industry committees from District 2 on matters like joint use of facilities, lube oils, containers and gasoline sales hours.

The tender subject of fuel oil rationing is a separate department, handled by Ernest L. Hughes, chief of the fuel oil section. "Ernie" Hughes is no novice at selling heating oils, although rationing has been a two-fisted matter all winter and next season's procedure is being fought over by the industry at large.

Sees Rationing Needed

Others may question how and where to ration, but in Mr. Hughes' mind there is no doubt that ration we should. How else are our battleships, merchant marine and troop transports going to get our boys across the water for a knock-out blow at Berlin and Tokyo without plenty of oil? he asks. Mr. Hughes is an oil man from the soles up. His private business has long been tank car, transport and boat shipments of oil products to industries in the Mid-West, along with a large retail fuel oil business in Chicago. He is president of the Hughes Oil Co. and has been since 1921 when the company was formed.

Backing down the ladder of progress, in 1916, he founded the Western Petroleum Co. jointly with T. S. Black, who had been sales manager of the old Cudahy Refining Co. He had already gained some experience with the Oil Marketing Co. and Frank C. Henderson, starting in Oklahoma back in 1915.

A native of Louisville, Ky., he took a course in Ohio's Wooster College but left in 1917 to enter the lumber business in his home town.

Holland Directs Materials

Somewhere in another office a telephone rang. "Hello! Hello, John!" a good-natured voice said.

But the connection was not completed. Loyal B. Holland, director of materials, swiveled around, stuck out his hand—and began to laugh. He laughs easily for he enjoys greeting people. In fact, he enjoys whatever he does, particularly when there's time for a good story. It's not difficult to imagine that when he glances up from his desk, where he spends little time, and out through the window across Michigan boulevard to where hundreds of boys in khaki, quartered in the Stevens and Congress hotels, drill, parade and hold inspections, his heart thumps faster and he works harder.

"You ought to see them when the weather is good and the ground dry," he said of the soldiers. "It's an inspiring sight!"

'Plugs' for More Steel

The material and equipment situation has eased up a bit as the industry goes on the Controlled Materials Plan, but Loyal Holland is constantly plugging for more. No material—no oil! He knows that because he has been a petroleum engineer for a good many years. Graduate of Oklahoma University's college of engineering, he maintains his home at Norman and occasionally gets a chance to pay it a visit.

Production superintendent for Case Pomeroy in 1924-25 and equipment engineer for Phillips at Bartlesville for 3 years, he moved to Oklahoma City as district production superintendent when Phillips entered that field. He was later promoted to division production superin-

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tendent in charge of Phillips' southern division, including the states of New Mexico, Louisiana, Arkansas and Texas, except the Panhandle.

Sub-Office at Tulsa

He resigned from Phillips in 1936 to set up an office as consulting petroleum engineer and independent operator and joined PAW in April of last year at Chicago, with a sub-office at Tulsa, where he spends part of his time. P-98-b and subsequent orders affecting material used in the production of oil and natural gas are his specialties.

"This fellow here," he said, turning to Charley C. Brown, assistant director of production for District 2, "is always after something—any kind of material that will help get oil out of the ground."

A man who gets what he wants is worth following, so the trail led to Mr. Brown's desk. He's an Iowan—tasseled out with the corn crop in 1885—and a philosopher on government and people. But to keep this story in the editorial trench, he dressed tools for Allen N. Savings at Humboldt, Kans., in the fall of 1903, repeated the performance all over southeastern Kansas and northeastern Oklahoma for 3 years, and so became a driller at Robinson, Ill., in 1907. He wildcatted in the Hausna mountains . . . Columbia, Maricopa . . . and other California fields.

Next, he was oil and gas inspector at Pawhuska, Okla., which is in Osage county. That wealthy Indian tribe in multi-colored blankets and big, red Stutz automobiles going 60 m.p.h. in 1916, dodged around trees and boulders on crooked dirt roads getting from town to tepee. Their oil wells were doing okay.

Marland Co. of Delaware was organized in 1922, and Mr. Brown became vice-president in charge of production, pipelines and crude oil purchases. Later, when E. W. Marland became governor of Oklahoma, Mr. Brown assisted in organizating the Interstate Oil Compact.

"I spent two and a half years attempting to interest Oklahoma citizens in their government," he explained. And he was again on his favorite philosophical subject—one closest to his heart.

Stepping on Them Gently

PAW tries putting a soft foot rather than a heavy boot on the necks of regulation violators, so Charles K. Schwarts is District 2 counsel—not a lawyer in the hard-heeled sense.

"We've been able to bring about, with both complainants and violators, a satisfactory solution of problems without prosecution so far," he said. "I find that the public is willing to do its part in winning the war. There are few wilful transgressors."

There are, however, many legal matters which require counsel "just to keep things straight."

In private practice Charles Schwartz is senior member of Gottlieb & Schwartz, Chicago law firm. He received his LL.B. degree from John Marshall Law School, where he studied at night. He was appointed to PAW on Oct. 1, 1942.

Herndon is 'Naturals' Man

Seth Herndon, director of the District 2 natural gas and natural gasoline division, stood behind a desk, thumbed through a sheaf of letters. He sat down and offered a chair.

"They've been short of fuel oil in the Kansas-Nebraska area all winter," he said. "But I don't know just when that new gas pipeline to the Hugoton field will be built. Line pipe is not so plentiful. Takes a lot of steel for other things—and a lot of natural gasoline for blending, too."

Herndon Drilling Co., Tulsa, Okla., is Mr. Herndon's company. He spends a great deal of time in the District 2 sub-office at Tulsa.

In problems of pipeline demands for natural gas and liquefied petroleum equipment and materials, Mr. Herndon is assisted by Mark S. Patton, who joined PAW May 1 last year. He is president of Hurley Gasoline Co., Tulsa, on leave of absence.

Born in 1887 in Kansas City, Mo., he was graduated from Westport Central High at 16 and went to Coffeyville, Kans., where he "worked around", mostly in the oil fields. In 1914 he landed a job in the Cudahy Refining Co. refinery there. When Sinclair took over Cudahy, he went to Tulsa in charge of sales for Western Oil Co. He assisted in organizing the Hurley Gasoline Co. in 1922, and had charge of sales there until 1927, when he became president.

He and Mr. Herndon alternate on trips to Chicago, so that one will always be on the job in the PAW Tulsa office, where most of their activity takes place.

District 2 transportation director is Walter DuMont, now on an extended leave of absence following recovery from a serious operation last winter. During Mr. DuMont's illness, Paul J. Bond, his assistant, shouldered transportation problems. Now, Mr. Bond is acting director of transportation for District 2 and in addition has been made director of petroleum supply under PAW Directive 65, which calls for zoning of supplies and distribution in the Mid-West.

Mr. DuMont, as well as Mr. Bond, came to PAW from Pure Oil. Mr. DuMont is a New Yorker, initiated at 26 Broadway with Jersey Standard which he left in 1920 to become an independent operator in Oklahoma and Texas where he drilled wells until he came with Pure in 1933. He joined PAW in August, 1941, as District 2 transportation director.

Mr. Bond started with PAW as assistant chief of the tank car section in Washington in April, 1942. He was transferred to Chicago last August. Mr. Bond first started shoving freight cars around when he began work in the freight office of Trans-Penn Railway at Columbus, Ohio, but soon switched to the traffic department of Ohio Cities Gas Co., which was later absorbed by Pure.

As director of petroleum supply under Directive 65, Mr. Bond has responsibility of approving tank car shipments. Two little letters—"OK"—will do the trick, can be scribbled in the bat of an eye. But when requests for tank car permits must necessarily start coming back to the industry without that "OK", when the brakes are slowly applied and zoning made effective, it is his hope that there will be no batting of eyes or batting of anything else. The industry will surely appreciate the wartime struggle to meet its responsibilities. Zoning carries with it many problems which require time to work out. Motor transportation, river barges and Great Lakes tankers take on added significance, and they all come under Mr. Bond's direction at one time or another.

'Most Unnoticed Department'

Probably the most unnoticed department in the PAW branch is the facilities and securities division directed by E. J. Bullock, the pleasant, white-headed ex-director and ex-vice president of Standard of Indiana in Chicago. He retired from active service with Indiana Standard in June, 1939, but along came the war and PAW needed a man rich in experience and life in the oil industry. So Mr. Bullock was called back to duty last October. He has a corps of engineers working with refineries and natural gasoline plants all over District 2. He came from Cleveland, Ohio, originally, and entered the oil business at Milwaukee, Wisc.

Seth Herndon (right), chief, and Mark S. Patton (left), assistant chief, run the PAW division of natural gas and natural gasoline in District 2

District 2 director of PAW's facilities security division is E. J. Bullock (left). With him is Charles K. Schwartz, PAW's District 2 counsel

SECOND EDITION

Platt's WAR-OIL DIRECTORY

At every busy oil man's elbow

Contains Over 2,000

Names,
Titles,
Committee and war-oil agency connections
Addresses,
Telephone and extension numbers

of the men and women who are active in the nation's vital war-oil program. Platt's War-Oil Directory also lists all the more important:

War-Oil Committees and their members.

These are the people to whom you must write letters—call on the long distance telephone—and negotiate with daily.

GOES TO PRESS MAY 10th

The new (2nd) edition of Platt's War-Oil Directory is now in preparation. It is going to press May tenth—right on the dot, revised, right up to the last minute, according to the very latest official information.

Government agencies,
War-Oil Committees,
Oil men's associations,
State officials,
and hundreds of individuals,

all over the country are cooperating with us *enthusiastically* to make this new edition better and as nearly 100% accurate as possible.

Mail the Coupon TODAY!

Platt's

"I wonder just who they put on THAT committee?"
"What department is that fellow I met last night connected with?"
"How can I reach that man, Holmes, in a hurry?"
"Is he in OPA or WPB or what?"

You will find a ready answer to these and many similar questions that come up daily in the forthcoming second edition of Platt's War-Oil Directory. But remember, you are not the only one who lives in a world of doubt and confusion these days. Think of your secretaries, stenographers and telephone operators.

YOUR SECRETARY wants to know how to spell "that man's" name correctly.—She wants his initials, title, his correct address. If he works in one of the many huge government bureaus, she will need the name of the building in which his office is located and his **correct room number.**

YOUR TELEPHONE OPERATOR needs the man's correct name, his official title, and his correct initials too, and often the name of his committee or department. But, she must also know, not only the telephone exchange through which he may be reached, but also his **correct extension number.**

PLATT'S WAR-OIL DIRECTORY saves you TIME and MONEY

Correct Addresses Save TIME—This directory will make it easy for your secretaries and stenographers to find your correspondent's name and spell it correctly—and get his title and initials right.

The Post Office is urging oil men to help speed up its service. The Post Office has a manpower shortage, just like everyone else. It wants us to avoid misdirected letters and incomplete addresses. That makes sense. By obviating any necessity for going through the Post Office's directory service, you will insure your letter's reaching its destination in the shortest possible time.

Save Money on Long Distance Calls—There are 40,000 to 50,000 people being served by some of the war agency exchanges. By calling the extension number—as well as the exchange number—you not only get your calls through faster, but you avoid many mistakes that would otherwise show up on your telephone bill at a late date.

The government is demanding that we, in the oil industry, make more efficient use of the long distance telephone. Here is one way you can cooperate easily and to your own advantage. See that your PBX operators—all of them—have each a copy of this book for instant reference. They can then call the man you want to talk to with the least possible delay—and without going through the telephone company's directory service, or running up excessive tolls. Consider also how much wear and tear on your nervous system such prompt, faultless service will save.

ORDER TODAY—A directory of governmental personnel begins to grow obsolete rapidly these days. That is why the directory has to be reissued frequently. The sooner you receive your copy of this new second edition, the more use you will get out of this book—the more you will get for your money. So mail the coupon below today.

ORDERS received before May 10th will be mailed by May 15th

Price List

Quantity	Prices
Single Copy	$2.25 each
10 to 24	1.95 each
25 and over	1.90 each

Platt's War-Oil Communication Services, 5543
1213 West Third Street, Cleveland, Ohio.

Ship me.....copies "PLATT'S WAR-OIL DIRECTORY" as soon as they are off the press.

Check is attached for $.....

Name.....

Company.....

Address.....

City-State.....

WAR-OIL COMMUNICATION SERVICES

FIGHT WARTIME WEAR WITH VICTORY CARE

Here's the new battle cry that's bringing in more business to Cities Service Stations!

Now that America's motorists face the problem of getting another year of use from their old, worn automobiles—you'll have a bigger-than-ever opportunity to sell a service package this Spring.

And Cities Service is now featuring one that's just a "natural" for profits, too, because:

1. It's built around a real hard-hitting, business-building slogan that every motorist understands—"*Fight Wartime Wear With Victory Care!*"
2. It's backed by an all-out promotion to help you sell it—including the famous Cities Service Concert that's heard by millions from coast-to-coast!
3. It offers the motorist *everything* he needs—complete change-over . . . thorough lubrication of chassis, transmission, differential . . . complete Cisco Solvent pep-restoring treatment . . . over-all service check-up!

Help your customers "*Fight Wartime Wear With Victory Care*"—at your station this Spring—and you'll find yourself making *extra money* for many, many months!

MAUMELLE ORDNANCE WORKS
CITIES SERVICE DEFENSE CORPORATION

OIL IS AMMUNITION—USE IT WISELY!

CITIES SERVICE OIL COMPANY
NEW YORK • CHICAGO

IN THE SOUTH
ARKANSAS FUEL OIL COMPANY
SHREVEPORT, LA.

Easing the Blow

How One Company's Frank Statements, in Advertisements to its Customers, Helped Wipe Out Friction & Delay in Fuel Oil Rationing During Past Winter

We're under-staffed, under-equipped, over-worked and rationed, too!

That's the message Charleston Oil Co., Charleston, S. C., got across to its customers through a series of newspaper advertisements last winter, practically begging customers for cooperation on fuel oil rationing.

The company's frank statements greatly eased its burden and smoothed out jagged edges of temper between customers and company employes, according to T. Wilbur Thornhill, president.

The ads, beginning in December, and often tersely-worded to press home their points, warned against now-impossible peacetime services, against procrastination, criticism and other human failings. Eight general "don'ts" in the first ad asked fuel oil users not to wait until out of oil to telephone; not to expect delivery at any set hour; not to ask the supplier to come to check the tank; not to ask him to deliver to one place and collect coupons someplace else; not to call continuously about delays; and not to indulge in other hindrances that delay and harass the under-staffed, under-equipped, and over-worked supplier.

No Words Minced

Mincing no words after leading off with a disarming apology, one ad took procrastinators to task, thus:

"We Apologize," in large, bold-face type, "to the many customers whom we were unable to serve Monday.

"Here's what happened: Up to 1 p.m., we had received 225 calls for oil—50 or 60 . . . who . . . were completely out."

"Here's what happened . . . last week: During . . . 3 warm days together, there were only 125 calls, with the result that 3 trucks and their drivers were idle in our plant much of the time.

"Next time," it suggested, "please take advantage of warm weather to order the oil that a change in weather would make necessary. Otherwise, next time will be just like this."

Swamped with telephone calls at the crack of a cold spell, a series of ads harped on the use of this instrument.

"Our telephones," the first of these lamented, "have been rendered almost useless by so many people calling up, wanting to know where the oil was that they ordered yesterday, or the day before, or the day before that. We cannot speed delivery beyond exerting our best efforts."

Then it told why.

Wishes It Were Santa

"We wish that we could be a Santa Claus at the end of your telephone line, miraculously supplied with oil enough for *everybody's needs* —and just as miraculously able to deliver it to you without a moment's delay!

"Unfortunately, we are capable of none of Santa Claus' miracles. We don't have near enough oil for everybody—and can't get it. (It's rationed to us, too, you know!)"

Neither does it have "near enough" trucks and operators and "practically no chance" of getting them, the ad continued, explaining that

whereas the season before last one man and truck could serve 30 to 50 customers per day, last year this was cut to 20 to 35 customers per day, and this year, 10 to 20. Increased traffic due to war workers, the multitudinous details of rationing, recording the coupons, tearing them off, and keeping account of them, and lack of sufficient help, were given as causes.

Hurts Company, Too

Reminding customers that its ideals of service had not changed and that it was still in business to do all the business it can, "conditions over which we have no control" prevent it from rendering the type of service on which it prided itself formerly.

Appealing for sacrifices by all as a means of cooperation for victory, one ad recounted:

"The rules and regulations of the Petroleum Administrator for War are such that we have not received adequate supplies . . . . It is one of the necessities of war, and though we may feel that the situation could be handled better, and do everything . . . to see that it is improved—we still have to abide by the consequences."

Asks Indulgence

Giving the public credit for understanding once it knows the facts, the ad explains: "We know that . . . the public will be indulgent in making due allowances and sparing criticism. We will never be satisfied until we are again rendering our old efficient service—but in the meantime this war requires sacrifices by all of us—which we are willing to make—to speed the day of victory."

What the company and the fuel oil dealers of Charleston have already done to attempt to alleviate the oil shortage and to obtain improvement in the rationing plan if there is to be one next year in this area, are set forth in several of the latest ads. A pipeline to Charleston is one suggestion and people are urged to support it by writing their congressmen. Civic and business leaders of the city already back it, the ads say.

Another recommendation is the discontinuance of rationing in the South Atlantic states where mild weather requires small consumption compared to other colder areas, effecting only a small saving.

"Rationing," one ad declares, "costs far more in energy dissipated along with other harmful results, than the good accomplished."

We Know It's Annoying

YES, IT'S ANNOYING—to need oil and not be able to get it on the dot. But here's how it is: at our end of the line, at the time of receiving your order, we date it and time it. And by that record, we deliver.

Even so, there is delay. But, one call is all that is necessary, although you may feel that you should repeat it. It is not that you have been forgotten, not that we fail to understand. We are very much concerned . . . certainly not at all indifferent . . . and we want to do our best to serve you.

The multitudinous details associated with the handling of rationing coupons—and the heavy movement of traffic in Charleston streets, combine to make delivery slower than in former seasons, but be assured—we'll get to you just as quickly as possible.

KEEP THE OIL TRUCKS ROLLING!

Because TIME is so precious in the operation of all trucks these days, we request you positively to let them out of your driveways or alley, straight on to the street, ever to the right for delivery to your home when you, last or first to be supplied for today. Thank you.

The telephone is our over-worked means of communication, and we entreat you to be sparing of its repeated use to hasten your oil delivery.

Please place orders between 9 A. M. and 5 P. M. so that we may remain the best of friends.

Cordially yours,

Charleston Oil Co.

Typical ad in the series, sympathizing with the customer but telling company's side as well

Independent Oil Men Wield Power

A Speech by Warren C. Platt Delivered at the Annual Meeting of the Empire State Petroleum Assn. in Syracuse, N. Y., on March 11, 1943

THIS is a subject that has been close to my heart for a great many years. I have seen the Independent oil men use their political power many times and for the great good of the oil industry as a whole and to the country. Economic reforms have come to the oil industry from this use.

But despite a long history of the exercise of such political power, the average oil jobber today doesn't seem to recognize that power in himself, nor do the larger interests in the oil industry recognize the jobbers' political power.

The oil jobbers' problems are economic, yes, but they will have to be solved, at least largely, through the exercise of political power. People in office today, as in the past, naturally listen to protests according to the number of people back of those protests. The jobber today will be listened to according to the listeners' conception of his political powers and if those powers seem great, the jobber will get the best of attention to his political problems. If the powers seem weak and puny, the jobber may be passed by in favor of other protestants of greater power. I say this not to be critical of people at Washington or elsewhere, but to give you a picture of your problem and if possible, to give a clear picture also to the major oil interests.

Let me recount a little history, and let it be taken without being criticism of any group in the oil industry.

I give full credit to the major oil companies for the great things which they have brought the oil industry and to the American public. These large size oil units have helped to stabilize the oil industry. It has been through their large organizations and financial power that the industry has been able to develop technically in producing, refining, and marketing. But while being thus so busily engaged, I am afraid many men in the major oil companies have overlooked your strength and many of your problems. You oil men are strong in your home communities and by tying together all of your home communities—you then become strong nationally. Because of this strength, you men have also brought great things to the oil industry and to the country. It might be said that you have brought democracy in the oil industry, for, unless there are a whole lot of people in an industry, giving a great deal of competition, that industry not only in the past but particularly in the future comes more and more under government control. The extent to which you men can prove your political strength, your independence, your competitive value, to that extent you will prove the strength of the oil industry and to that extent you will insure the freedom of the oil industry—your freedom and the freedom of the major oil companies.

Let me go back into history a little, not to rattle bones in my closets, but to prove my point of the value of independent competition and the political strength of the Independents in the oil industry. Many of the economic reforms and industrial achievements in the oil industry have been the result of protests of Independent oil groups—producers, refiners, and marketers. Back in the '80's, a group of Independent producers and refiners built the first pipeline from western Pennsylvania to the Atlantic Coast. They did it in protest to the then Standard Oil Co. The price of crude oil had declined because of a surplus. The producers rebelled at the Standard's prices, accused the Standard of unfairly lowering prices and then banded together to build this pipeline, a refinery, and subsequent marketing outlets. That was the first pipeline to the East Coast and it was a great contribution to the economic strength of the oil industry because it afforded additional outlet for crude and products and it more firmly established competition.

After this pipeline and refinery had afforded relief and the price of crude went up, more flush crude oil production came in and again the prices went down. Again Independent refiners and producers banded together and built another pipeline and another refinery. This was that of the old Pure Oil Co. at Philadelphia.

THEN came a big battle over railroad rebates. Everybody took them and everybody gave them. Independent oil men, however, felt that they were being discriminated against so they carried a battle against rebates to Congress. Laws were passed forbidding rebates and establishing the present Interstate Commerce Commission with full authority over railroad transportation. That fight by the Independent oil men, particularly of the East, was to bear fruit some years later in the battle of Independent refiners in the Mid-Continent field for lower freight rates which would permit them to come up North and East and establish Independent jobbing outlets.

Almost immediately following this battle of the Independent oil interests, came the one for the dissolution of the old Standard Oil Co. As in past battles, a political appeal was made to the authorities of government. They responded because they were interested in votes as well as righting any wrong that might exist. The many fights that had been made prior to the dissolution suit received much newspaper publicity. There had been many hearings in Congress. Many speeches were made. Many suits had been filed in many courts. All of this had built such a public resentment that it was possible to interest the then President Roosevelt in attacking the great Standard Oil Co.

The Independents and President Theodore Roosevelt finally won that dissolution suit. That suit was worth untold millions of dollars to the elder Mr. Rockefeller because it solved for him what might otherwise have been an impossible management problem. If it hadn't been for that suit, he probably would have gone on trying to manage one vast company from one office at 26 Broadway. In view of the simply tremendous growth of the oil industry

from the time of the dissolution suit, because of the coming of the gasoline era, Mr. Rockefeller and his associates might have found that problem an impossible one. At all events, the suit broke up his company into units which were subject to local management to meet the conditions local in different areas in the country. The suit also opened up the way for the establishment of the Independent oil industry and the creation of still more competition within the oil industry. Most of the major oil companies of today were the outgrowth of that suit, so the politics that were played in getting that suit started, the politics that went before that suit and which made it possible, all contributed toward a greater oil industry rendering a greater service to the public.

Immediately following the winning of that suit, another of great importance was started. That was to make pipelines common carriers in law and in fact. Independent oil producers of the Mid-Continent field and Independent refiners made violent and public protest one summer 30 years ago because the price of oil was low, there weren't enough buyers, and, so the producers claimed, they could not ship their oil through pipelines because those lines were operating mostly as private carriers.

Your speaker, in an innocent moment, helped to stage the publicity from which came a suit in which the United States Supreme Court held that Congress had the authority to regulate pipelines and that Congress had made them common carriers in law. All pipelines then were required to file a tariff. Whether the suit ever had any value to anyone may be a debatable question in view of the fact that few, if any, people have ever tried to use the pipelines generally as common carriers, but at all events, for the purpose of my remarks, it was a great legal victory and it was started and won largely through the political influence of the large number of Independent oil men.

Then following this victory came years of fighting before the reorganized Interstate Commerce Commission for lower freight rates from the Mid-Continent refining points up north and east. This fighting was done by an association of Independent refiners. It was successful largely because it was accompanied by a considerable amount of political fighting and legislative investigations. Thousands of freight rates were lowered in this war and thousands of Independent jobbers were created. While the Interstate Commerce Commission, like other judicial bodies, is guided by the facts and the law in its determination, nevertheless it is generally recognized that the Courts also reflected the spirit and thinking of the times and that spirit and that thinking generally came from those who are rightfully, politically vocal.

During these years of battling down freight rates, the growing body of Independent jobbers and refiners were the ones who were decidedly providing more and more competition within the oil industry.

Then we come to the famous Madison Oil Case of 1937 and 1938. There is no doubt but that the present Administration at Washington seemingly took up the cause of Independent oil jobbers because the Administration thought it was politically good and because it served the Administration's political ends. There is also no doubt but that the Administration was not interested in doing anything for the Independent oil jobbers on whose complaint it acted, but it was interested in attacking the major oil companies. The Independent oil jobbers got nothing whatsoever from the various suits tried and settled, and because of the manner in which the suits were brought and tried the Administration also got nothing but virulent criticism. However, again, the suits were a recognition of the political strength of the Independent oil man and his cause and a recognition of how defenseless politically are the major oil companies.

The very latest evidence of the political strength of the Independent oil jobber is in the ouster of Leon Henderson as chief of OPA. Let me say first, as the fight has been misunderstood by people in the East—the Independent oil jobber of the West was not seeking any advantage over anyone else in the country in asking that gasoline rationing in the West be postponed. The sales reports of that western jobber showed that his customers were more and more voluntarily conforming in the conservation of their tires to the request of the Baruch rubber committee. National gasoline figures seemed to bear that out. All the western jobber asked was that a thorough investigation be made of his figures and national gasoline figures to see if the car owner was not actually voluntarily conserving his tires sufficiently and thus not in need of official gasoline rationing.

BUT Henderson and his professorial associates would not listen. They wanted to run the oil marketing business so Henderson and his associates got rough. With the aid of Rubber Director Jeffers and others, they even accused the Independent oil jobbers who asked for further investigation of gasoline consumption, of being pro-Nazi. Henderson and Jeffers even sicked the FBI onto these protesting jobbers just as Hitler does the Gestapo in Europe. That produced a political uproar that was so great that the Administration had to fire Henderson. The Administration tried to make it out that it was the farm bloc that produced this uproar. Many of the men who joined in the protest against Henderson's arbitrary extension of gasoline rationing, were members of the farm bloc, but don't let anyone fool you. The uproar was started and maintained by the Independent oil jobbers of the Mid-West and Henderson's departure was their victory, as well as a victory for mankind and freedom in this country. That is as striking an example as I could give of today's strength of the Independent oil man.

The Independent oil producer over the years has built up a number of strong independent organizations, due to the large number of producers and due to the political strength of those producers. There are the various Mid-Continent oil and gas associations of the western states. There is also the Independent Petroleum Assn. of America. This was started many years ago by one man who waged a successful fight for a tariff on Mexican oil. That man is Wirt Franklin, now head of the PAW at Chicago. From his successful fight on the tariff, of many years ago, came this great association of which Mr. Franklin for years was president. That association has achieved many helpful objectives for the Independent oil man, for the oil industry as a whole, and for the country. It has a strong, efficient, and aggressive body.

It would be better for the Independent oil jobbers and the Independent refiner and the oil industry as a whole, if they, too, had a central and strong, aggressive organization similar to that of the Independent producers. Such an organization I hope is now being formed in the National Council of Independent Oil Assns., of which your President, Mr. Harper, is an active member. This Council represents many of the state Independent marketing associations. It is to be hoped that it will soon represent all of them because the job of telling the story of the Independent oil marketer at Washington is too big for any small groups of jobbers to do. The jobber has numbers and in those numbers he has great political strength, in most of the states; nevertheless that strength is of little value unless it is centered behind a strong factual presentation of the Independent oil man's cause.

Today the Independent oil man needs a wider margin on which to do business. That calls for higher prices. That Independent oil man must prove his need for that wider margin, must prove it from his own books. Not just one oil man must give the proof, but a large number of Independent oil men must furnish it. That proof must be analyzed and organized and presented in an effective manner to the authorities at Washington. Those authorities are open-minded, decidedly so, in favor of the Independent oil man. They want him to live and I believe them when they say that. The new chief of the OPA, Leon Henderson's successor, Mr. Prentiss Brown, and his associates, have said many times that they want to protect the small business man. Mr. Brown, in seeking re-election as United States Senator from Michigan, campaigned last fall for the small businessman and the small oil man, and campaigned against Leon Henderson's extension of gasoline rationing. I know, from conversations with many in OPA, that their minds are open to reasonable argument in behalf of the small Independent oil man. I know the same is true of PAW; but to take advantage of these openings, the Independent oil jobber must be better organized than he has ever been in his history.

I hope that this recital of the political victories of Independent oil men over the years will be so convincing to the Independent jobbers of today that they, recognizing their political strength, will organize to make an effective and constructive use of it not alone on their own behalf, but on the behalf of the whole oil industry and of the country.

Chemicals, Oil Refining Wages Up 40% in 1939-42 Period

NPN News Bureau

WASHINGTON—Annual average wage per employe in chemicals and petroleum refining increased 40% during the period 1939-1942, according to the U. S. Department of Commerce. Average wage in 1939 was $1606; in 1940, $1814; in 1941, $1997; and 1942, $2256, according to the department's figures.

At the same time, the department said, average annual wage per employe in oil and gas production increased 16%, from $1714 in 1939 to $1793 in 1940; $1861 in 1941; and $1995 in 1942.

The 40% increase in chemicals and petroleum refining and 16% in oil and gas production compares with a 29% increase in all nonagricultural industries.

11 Companies Report 1942 Earnings

NPN News Bureau

CLEVELAND—Earnings of oil companies and their subsidiaries for 1942 as contained in their annual reports to stockholders the past week, were:

Amerada Petroleum Corp.—Net profit of $3,271,885 compared with $2,569,560 in 1941, after intangible drilling costs and all other charges. Operating income was nearly $17,000,000, and taxes and other charges $7,000,000.

° ° °

British American Oil Co., Ltd.—Net earnings from Canadian operations were $2,856,270, which is $54,022 less than in 1941; and from U.S. operations, $1,079,251, after all taxes, wartime reserve and other charges. Canadian income taxes were $2,617,281 on gross profit of $8,032,543. Wartime inventory reserve provision was $250,000.

° ° °

Crown Central Petroleum Corp.—From a gross operating income of $7,834,065, a net profit of $4652 was realized, after taxes and other charges, including loss of $62,622 from sale and abandonment of capital assets.

° ° °

Honolulu Oil Corp.—Net income, after deduction of $342,327 for federal income taxes and after other tax deductions, was $1,592,475, or $1.70 per share, a gain of 53c per share over 1941. Before provision for depletion and other charges, excluding taxes, net income was $3,221,000 compared with $2,885,000 in 1941.

° ° °

Indiana Pipe Line Co., Buckeye Pipe Line Co., Northern Pipe Line Co. and New York Transit Co.—Net income for these 4 companies, unified in 1942, were, respectively: $339,779; $843,257; $95,275; and $126,664, after all taxes and "extraordinary items", such as sale of oil and oil used in operations, profits on sale of securities and disposal of land, maintenance of inactive property, etc. Taxes were, respectively: $214,568; $1,331,098; $214,958; and $39,075.

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Standard Oil Co. (Indiana)—Net earnings in 1942 were $44,183,893 after operating costs, taxes and all other charges. This compares with $48,385,966 in 1941. Net per share in 1942 was $2.89 compared with $3.17 in 1941.

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Standard Oil Co. (N.J.)—Consolidated net earnings were $83,361,920 in 1942, compared with $140,572,419 in 1941. Earnings of the parent company totaled $88,907,077 against $84,826,764 last year. Figures were after taxes and all other provisions.

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Socony-Vacuum Oil Co., Inc.—Net earnings in 1942 were $30,808,397 compared with $43,175,902 in 1941, after all taxes and other charges. Direct taxes paid in 1942 were $71,530,419 plus $68,855,227 collected for states on gasoline. Gross operating income was $556,254,517 and total assets $970,115,471, according to the company's annual report.

Jersey Sees Need to Tap Oil Pools Outside U. S.

NPN News Bureau

NEW YORK—Welfare of the world after the war will make it imperative that untapped oil resources in countries outside the U. S. be made available to society, world-wide, Ralph Gallagher, president of Standard Oil Co. (N. J.), states in the company's annual report to stockholders.

"A wise foreign policy on the part of our own government will take into account, along with our national requirements, this world need for the development of new sources of oil supply," Mr. Gallagher said.

Reporting on manufacturing operations in 1942, the Jersey company president said Jersey has scheduled for completion this year 5 more fluid catalytic cracking plants of larger capacity than the 3 completed last year.

"Construction of 33 fluid catalyst units at a cost of more than $100,000,000 has been undertaken by 16 different oil companies," the report said. The new process produces motor gasoline, heating and Diesel fuel oil, 100 octane aviation gasoline, and large yields of hydrocarbon gases suitable for synthetic rubber and other synthesis operations.

Progress Through Alkylation

"Great progress has been achieved through the application of alkylation (for making aviation gasoline), a method of synthesizing refinery gases to obtain a high octane blending agent for use in aviation gasoline hydrogenation and fluid catalyst cracking. Through these foundation studies in which the company pioneered, and through supplementary developments originating with others, the limits of production of 100-octane gasoline have been raised from a yield of 10% from average crude oil to 50%." A Buna-S plant is under construction at Sarnia, Ontario, by Imperial Oil, Ltd., in conjunction with the Canadian government.

President Gallagher reported how the company is launching into industrial alcohol through the purchase of a 13% interest last October in the Standard Alcohol Co. from the National Distillers Products Corp. An additional alcohol plant is under construction at Baton Rouge, to be in operation this year.

He also reviewed the company's contribution to synthetic rubber, saying: "Two-thirds of the butadiene to be produced from oil under the Baruch program will come from processes developed in our laboratories."

Higher Costs Cut Profits

During 1942, Jersey Standard moved 170,825 bbls. per day of oil to the East Coast via tank car, approximating 20% of the supply brought into District 1 via rail by the entire industry. Costs of new methods of transportation are from 5 to 7 times greater than by normal tanker shipments, Mr. Gallagher commented.

Citing the decline in consolidated net earnings for the Jersey Company, Mr. Gallagher explained that unit costs were higher because of decreases in crude production, refinery runs and sales. Marine costs were also abnormally high and "pipeline earnings were adversely affected by tariff reductions". These factors are in addition to the higher costs caused by dislocation of normal relationships between production, transportation, manufacturing and distribution.

Jersey company's marketing operations were hit by rationing. ". . . The shortage of oil in the eastern states, in which a large part of its marketing area is concentrated, was reflected in reduced sales resulting from rationing. These sales were 10% below 1941," the report said.

The report looked upon the survival of retail service stations as a "major problem" and declared it is important to transportation that dealers be helped in their effort to stay in business until the end of rationing.

Jersey to Reject Resolution Hitting Ties with 'I.G.'

NPN News Bureau

NEW YORK—Standard Oil Co. (N.J.) announced April 29 that its management will oppose a resolution by William Floyd II, chairman of the minority stockholders' committee, to the effect that Jersey "shall not resume cartel relations with I. G. Farbenindustrie after the war".

Floyd has notified Jersey that he will present this resolution at the company's annual meeting June 1.

"The management will urge stockholders to reject this proposal . . . because of its vicious and unwarranted implications that the company's acts have been inconsistent with the national welfare," the Jersey announcement stated. Branding the implications as false, the announcement asserted Jersey's contributions to the national welfare before the war and now are "manifold and outstanding" and that "the company will of course continue to act in the nation's interest during and after the war."

Canada Company's Earnings Lower

Special to NPN

TORONTO—Supertest Petroleum Corp. in 1942 earned $302,047 compared with $360,392 the previous year. Working capital declined from $613,897 to $357,218. J. G. Thompson told shareholders the decline was due to gasoline rationing beginning last April which was responsible for a falling off of civilian motoring in Ontario amounting to an estimated 35% to 50%.

McColl-Frontenac Earnings Rise

Special to NPN

OTTAWA—McColl-Frontenac Oil Company earned 45.8c a share on its common stock in 1942, against 43.5c in 1941. Crude oil purchased for refining decreased from 6,674,390 bbls. in 1941 to 5,512,063 last year due to the lack of ocean transportation. J. M. Pritchard, president, says the company will continue its search for crude oil in western Canada, for which in recent years it has spent more than half a million dollars.

'Profs', Bureaucrats Scored In Plymouth Oil Report

Special to NPN

PITTSBURGH — The "professorial contingent" and "impractical bureaucrats" who "look at a select list of corporate earnings statements" where profits come from refining and transportation rather than production, and then argue that no crude price increase is justified, are scored in the annual report for 1942 of Plymouth Oil Co.

"What would it avail," the report asks,

"if the impractical bureaucrats held down the price of oil and . . . prolonged the war for . . . years? Would a tinge of . . . 'inflation' make up for the lives of American boys . . . if the war dragged along because of a shortage of petroleum products?"

Charging that the "professorial contingent" who fix price ceilings has passed by the finding of new oil reserves, the report continues:

"The only specific suggestion . . . from . . . Washington . . . is a proposal . . . to grant subsidies to 'wildcatters'. This proposal is not only impractical but would result in regimenting the oil industry under government control.

"The oil industry does not want any handout from the government or anyone else. It merely wants an opportunity to exist and to continue . . . to serve the country."

Competition Compels Alertness To New Products—Brown

NPN News Bureau

NEW YORK—Pointing out that while today government gives the orders and industry fulfills them and is able to do so "because of the operations and skills developed in time of peace", John A. Brown, president, Socony-Vacuum Oil Co., Inc., in the annual report to stockholders for 1942, warns that free competition must be restored to American industry after the war.

"The oil industry", he says, "has been able to do this war job only because the companies in it were free to compete . . . in time of peace. Under our competitive system, management . . . must be on the alert to make better products, and devise more efficient methods. This system of free business operation must be restored when peace returns."

Oil Industry's Essentiality Cited in Sinclair Report

NPN News Bureau

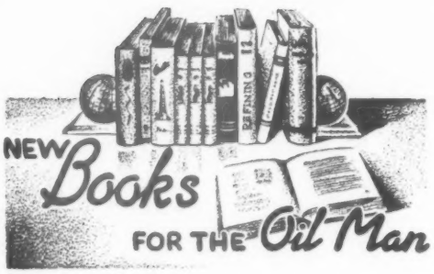
NEW YORK — Because PAW and WMC describe the oil industry as "one of the most essential of war industries", that "status must be the determining factor in setting the industry's course for the duration", Harry F. Sinclair, president, Consolidated Oil Corp., tells stockholders in the company's annual report.

One requirement of that status is that the industry must produce and transport more urgently needed products—"regardless of profit" —he said.

Barber Asphalt, Now Shipbuilder, Reports $311,175 Loss in '42

Special to NPN

BARBER, N. J.—A loss of $311,175 in 1942, after all charges, compared with a profit of $257,679 in 1941, is reported by Barber Asphalt Corp. During the year the company discontinued asphalt and petroleum refining and facilities were turned over to shipbuilding operations. Its Barber (Perth Amboy), N. J., cracking-topping plant, which had been operated at a loss for some years, was leased in May, 1942, to the company's newly-organized subsidiary, the New Jersey Shipbuilding Corp., and is "currently operating at a profit", according to Torkild Rieber, Barber's president.



Petroleum Chemistry Told for Laymen

In "The Amazing Petroleum Industry", just published, a long-standing need is supplied for a primer of petroleum chemistry and the technology of refining, for the laymen in the oil industry and the interested public. This book is timely in view of the development and application of new processes of synthesis for the manufacture of such products as aviation gasoline, toluene and synthetic rubber, among others. Those in the oil industry who sense that the refining business is on the threshold of an era in which chemical manufacturing methods will greatly replace former distillation processes and who feel their reading of technical literature is limited because of a lack of knowledge of chemistry, will find this book a real help to their better understanding of these new developments.

The author, V. A. Kalichevsky, is a well known scientist in the petroleum industry who is now supervisor of research and development for Socony-Vacuum Oil Co., Inc. He has been engaged in research work for oil companies since receiving a degree in chemical engineering from California Institute of Technology in 1924. He has been a contributor of papers to the American Chemical Society and author of several scientific works on refining, a late one being "Chemical Refining of Petroleum". He is a native Russian, served in World War I and wrote a number of books in Russian on military tactics.

"The Amazing Petroleum Industry" goes briefly into the production of petroleum and the economics of transportation by various methods of crude and products. However, it is the discussion in simple terms of the chemistry of petroleum hydrocarbons and the explanation of the changes in chemical nature that are achieved through the new refining processes such as alkylation, isomerization and so on that gives the book its greatest interest to students of the oil industry today.

The chapter on aviation gasoline shows the importance of hydrogenation processes in increasing the yield of light distillates necessary for volatile gasolines and the application of hydrogenation today in connection with other processes for increasing the volume of aviation gasoline components. What are alkylation, isomerization, aromatization and cyclization, and how they contribute to supplying aviation gasoline of improved quality and in greater volume is explained. The manufacture of toluene from petroleum is described briefly. A separate chapter shows the possibilities for manufacture of chemicals, including synthetic rubber, from methane, ethane, propane, butane and pentane and their related hydrocarbons. The book also contains chapters on the chemical treatment of light products and lubricating oils. Included is a limited glossary of petroleum industry terms.

This book is in no sense a defense of our industry, nor is it written with an ax to grind, as, unfortunately, has been true of some of the current works on this subject. It is a sincere effort by an oil industry worker who is in close touch with new scientific developments to give laymen some insight into what is in store in the future for a truly amazing industry, petroleum.

"The Amazing Petroleum Industry", over 200 pages, can be bought through the Book Department, NATIONAL PETROLEUM NEWS, 1213 W. Third St., Cleveland, for $2.25, postpaid.

° ° °

'Food, Work and War' Booklet

One master saboteur, "hidden hunger"—or malnutrition—of the war production worker is blamed for a large part of the sickness and accidents on the nation's assembly lines where 121,000,000 man-days were lost in 1942, according to a 48-page booklet, "Food, Work and War", published by the National Assn. of Manufacturers, 14 West 49th St., New York.

Since 75% of us, the booklet says, are "ill fed" and believed to suffer from vitamin deficiency, the dangers of such deficiency diets are pointed out and nutritious ones prescribed. There are chapters on education of the worker and his family on proper diet and helpful rules for plant cafeterias, including a table on the 5 "must" foods to be eaten every day, which are: milk, eggs, meat, fish or cheese; fresh green and yellow leafy vegetables; fresh fruit, especially citrus; and whole-grain, soybean or enriched bread or cereal.

A useful table on vitamins and minerals, their functions and foods in which they are found, and deficiency symptoms in the individual, is included.

The booklet sells for 15c per copy and is available from the NAM.

Need for 60-Day Oil Changes Shown by Pure Oil Tests

NPN News Bureau

CHICAGO—A 60-day oil change for cars driving fewer, slower miles under wartime conditions is recommended by The Pure Oil Co. following laboratory tests simulating "A" book driving conditions.

By operating a new Chevrolet for 36 hours under conditions similar to those brought about by gasoline rationing, including frequent starts and stops, periods of idleness, and 35 m.p.h. speeds, the company found 20% water accumulated in the oil, 15% greater bearing wear in the test engine, oil sludging, and carbon and gum-caked valves, according to *The Pure Globe*, dealer publication.

These water accumulations, the company said, are due to crankcase temperatures remaining abnormally low, with not sufficient heat to boil away the condensation, while bearing wear also was caused by crankcase water. If oil is not changed on a 60-day basis rather than 1000-mile basis, many customers by next fall will have cars laid up with motor failure, the publication warned.

The Studebaker Corp. also recommends a 60-day change for similar reasons, saying that a pint or more of water per month may accumulate inside an engine.

Oil to Coal and Back Again—Finds Conversion Easy

Special to NPN

KEENE, N. H.—J. A. Wright & Co. are so fond of fuel oil for steam production that when the company's plant faced the necessity of converting to coal the job was done so that "re-conversion" could be accomplished in about 5 minutes. And the conversion job cost practically nothing.

When Wright & Co.'s plant was erected in 1940, no consideration was given to any fuel but oil, and thus no storage room was available for coal. So a second-hand boiler was located in an old granite quarry, sections of metal stack were purchased from several sawmill operators, a second-hand pressure reducing valve and a return pump were located, and out of the conglomeration an auxiliary unit was built and placed under a shed made of second-hand timbers and old corrugated iron sheets.

It made a "disreputable looking housing", John P. Wright of the company admits, but when oil is available again, "we can switch over in about five minutes' time."

Socony Collected 43,597 Tons Of Scrap Material in '42

NPN News Bureau

NEW YORK—Total scrap collection in 1942 of 43,597 tons has been reported to W.P.B. by J. R. Taylor, Socony-Vacuum Oil Co. purchasing agent. Of this amount, 19,129 tons was of ferrous and 5153 tons of non-ferrous metals. Rubber collections totaled 18,941 tons.

Commenting on the report, R. T. Lawrence of WPB's industrial salvage branch stated:

"Early in the Spring your company furnished us an estimate of the amount of scrap which could be accumulated in 1942. This amount has been more than doubled, and we want you to know that we appreciate the time and effort necessary to achieve such splendid results."

TRADEMARKS

The following are trademark applications pertinent to our field pending in the United States Patent Office which have been passed for publication and are in line for early registration unless opposition is filed promptly. For further information address National Trade-Mark Company, Munsey Building, Washington, D. C., trademark specialists.

FLAGSHIP and picture of an airplane within a circle, Ser. No. 442,000 Capitol Tire & Rubber Co., Inc., Boston, Mass. Filed Mar. 27, 1941. For petroleum products—namely, gasoline and lubricating oils. Published: Dec. 8, 1942.

OCS OIL COUNTRY SPECIALTIES (OIL COUNTRY SPECIALTIES disclaimed) Ser. No. 454,696, The Oil Country Specialties Mfg. Co., Coffeyville, Kans., assignor to The Parkersburg Rig & Reel Co., Parkersburg, W. Va. Filed Aug. 3, 1942. For drilling and pumping equipment for oil wells. Published: Dec. 8, 1942.

PHIL KARB on shield, Ser. 457,746, Phillips Petroleum Co., Bartlesville, Okla. For carbon black. Published Apr. 20, 1943.

KOOLEX, Ser. 457,747, Phillips Petroleum Co., Bartlesville, Okla. For carbon black. Published Apr. 20, 1943.

PHIL LEX, Ser. 457,748, Phillips Petroleum Co., Bartlesville, Okla. For carbon black. Published Apr. 20, 1943.

EQUIPMENT PERSONALS

Johnston & Jennings Co., Cleveland, manufacturer of tank fittings and industrial stokers, has purchased exclusive manufacturing and sales rights of Rusta-Restor, a cathodic process for preventing rusting of water tanks, piping and similar steel structures, **H. H. Flemming**, vice-president of Johnston & Jennings, announces.

° ° °

At appropriate ceremonies Feb. 16, the Army-Navy "E" was awarded Columbian Steel Tank Co., Kansas City, Mo. Acceptance was by **J. M. Kramer**, general manager; **A. A. Kramer**, founder of the company; and **W. M. Gadberry**, sales manager.

° ° °

N. W. Stirling, head of the heat transfer division of The M. W. Kellogg Co., New York, has been appointed production director, on a consulting basis, of the heat exchange branch of WPB at Washington. Mr. Stirling was formerly president of the Tubular Exchange Manufacturers Assn.

° ° °

J. P. Seiberling, president of Seiberling Rubber Co., Barberton, Ohio, accepted the Army-Navy "E" flag for his company at ceremonies April 7.

General American Transportation Corp.'s East Chicago, Ind., plant was awarded the Army-Navy "E" April 19 by Col. Ray M. Hare. It was accepted by **Lester M. Selig**, president.

° ° °

Johns-Manville Corp., Manville, N. J., received the Army-Navy "E" Mar. 24 from Maj. Gen. Thomas E. Robins. Award was accepted by **Lewis H. Brown**, president.

° ° °

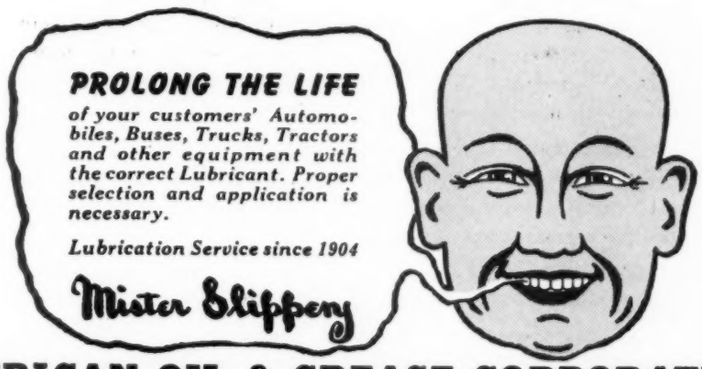
The Army-Navy "E" pennant was presented Mar. 27 to Clark Bros. Co., Inc., Olean, N. Y., with **C. Paul Clark**, president, accepting it from Lt. Col. Ernest W. Ogram, who represented the Army, and Com. R. G. Walling, who represented the Navy.

° ° °

The first in Dayton, Ohio, to receive the U. S. Maritime Commission's "M" for "doing its part in the battle-line of production" was Buckeye Iron & Brass Works. Presentation was made Mar. 26 by Col. Willard F. Rockwell, director of production for the commission, and acceptance was by **William P. Huffman**, president.

° ° °

In recognition of their safety work, employes of Brown Steel Tank Co., Minneapolis, have been presented Gov. Stassen's plant-safety award. Presentation was by Mayor Marvin L. Kline of Minneapolis, to **Arthur E. Brown**, general manager.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COMING MEETINGS

MAY

National Fire Protection Assn., Palmer House, Chicago, Ill., Mon.-Sat., May 10-11-12-13-14-15.
American Mining Congress, Coal Mine War Conference, Netherland Plaza Hotel, Cincinnati, Ohio, Mon.-Tues., May 17-18.
American Petroleum Institute, Mayo Hotel, Tulsa, Okla., Thurs.-Fri., May 20-21.

JUNE

South Texas Chamber of Commerce, sixth annual oil men's meeting and banquet, Gunter Hotel, San Antonio, Tex., Wed., June 2.
Society of Automotive Engineers, Diesel Engine and Fuels, Carter Hotel, Cleveland, Ohio, Wed.-Thurs., June 2-3.
The American Society of Mechanical Engineers, Hotel Biltmore, Los Angeles, Calif., Mon-Wed., June 14-15-16.
American Society for Testing Materials, William Penn Hotel, Pittsburgh, Pa., Mon.-Thurs., June 28-July 1.

OCTOBER

West Virginia Petroleum Assn., Annual Convention Daniel Boone Hotel, Charleston, W. Va., Wed., Oct. 13.
Indiana Independent Petroleum Assn., Inc., Hotel Severin, Indianapolis, Ind., Wed., Thurs., Oct. 13-14.
Petroleum Division, National Assn. of Credit Men, St. Louis, Mo., Mon.-Wed., Oct. 25-26-27.

NOVEMBER

The American Society of Mechanical Engineers, New York, Mon.-Fri., Nov. 29-30, Dec. 1-2-3.
Ohio Petroleum Marketers Assn. Inc., Annual Meeting, Hotel Deshler-Wallick, Columbus, O., Wed.-Thurs., Nov. 3-4, 1943.

DECEMBER

New Mexico Oil & Gas Ass'n., Artesia Hotel, Artesia, New Mexico, Wed., Dec. 1.
19th Exposition of Chemical Industries, Madison Square Garden, New York City, Mon. through Sat., Dec. 6-11.
Nebraska Petroleum Marketers, Inc., Fontenelle Hotel, Omaha, Tues.-Thurs., Dec. 7-8-9.

Special Issue of 'Texaco Star' Carries War Messages

NPN News Bureau

CLEVELAND—A special war service number of the *Texaco Star*, official publication of The Texas Co., is being mailed to the 24,000 employes of the company and to its stockholders.

This 48-page issue of the magazine, containing nearly 400 photographs of the company's more than 4000 employes serving in the Army, Navy and Marines is to be followed by a second section, according to W. S. S. Rodgers, president of the company. Included in the photographs are several women employes who have joined the WAACs and WAVEs. Several pages are devoted to employes engaged in civilian defense work.

Worn Wheel Bearings Blamed For Many Tire Failures

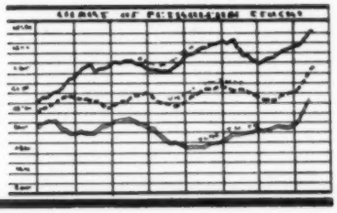
Special to NPN

AKRON—Chipped and worn wheel bearings cause premature failure of many truck and trailer tires and are mainly responsible for "flat spots", Goodyear Tire & Rubber Co. concludes after a study of tires on 100 truck and trailer fleets.

In one fleet of 497 trailers, 2 barrels of bad bearings were found in 90 days, wearing out 146 tires before maximum potential service had been achieved, according to the company.

The study was begun after it was found that less than 50 tires wear out among every 100 put on truck-trailers. The other 50 are discarded before normal life expectancy because of blowouts, cuts, repair failures, or mechanical defects. Worn bearings may be the result of overloading, or from improperly mated or incorrectly inflated dual tires.

Oil MARKETS



Pennsylvania

NEW YORK, May 1—Nos. 2 and 3 fuels and 36-40 gravity fuel were priced 0.25c higher in lower field early the week ended May 1 when the last refiner to advance fuel quotations raised his prices to the 6.5c quoted by majority of other refiners. New ranges were 6.5 to 7.125c for Nos. 2 and 3, 6.5 to 7c for 36-40 gravity fuel.

An upper field refiner, member of the East Coast transportation pool, reported quotation of 8.95c for "Q" gasoline, making the new range for that product 7.5 to 8.95c, up 1.2c on the high.

California

LOS ANGELES, May 1—Gasoline market remained steady, reports indicated extreme bottom of price range is 5c, 6c and 6.5c for the 3 grades.

In the fuel oil market some confusion exists. Large independents are known to be selling Pacific Specification 400 fuel oil at 95c, 15c under the ceiling of $1.10 per bbl. It is understood one independent will even write a year contract at $1.05 for P.S. 400. In general, independents are reported hesitant to write contracts because of rapidly changing conditions in the fuel oil market.

Atlantic Coast

NEW YORK, May 1—Gasoline continued "the tightest product of them all" along Atlantic seaboard the last week of April. Some suppliers said they were "just getting by" but others reported themselves without material and experiencing the worst shortage ever. Slight easement was reported in some areas when gasoline began to "trickle in" from the West as the result of PAW efforts.

Milder weather created a lull in fuel oil markets.

Mid-Western

CHICAGO, May 1.—Gasoline demand in Mid-West and Central Michigan increased last week, refiners from both areas reported. Central Michigan refiner said he was "completely out of gasoline" which was also reported by others as fairly representative of their position. Mid-Western refiners and marketers reported contending with inadequate stocks of gasoline.

Gulf

NEW YORK, May 1—Inquiries for 87 octane leaded gasoline, kerosine, heating oil, and "special fuels" were reported in the Gulf markets the past week. No spot sales were reported, refiners explaining bulk of material was moving to steady accounts. Several said their shipments were confined to government takings and local trade; some reported hindered by inadequate transportation facilities. Refiners' quotations for all products remained unchanged.

Mid-Continent

TULSA, May 1.—No changes in prices or supply-demand conditions were reported by Mid-Continent refiners the past week. Gasoline demand continued steady increase throughout most of area, it was said, with drain of material to northern states creating some local shortages in Oklahoma. Local demand in Kansas already was considerably in excess of production. Most refiners said call for distillates, range oil and kerosine had not slackened.

CRUDE PRICES

Since changes in crude oil prices are so few, the 2 pages of crude oil price tables hereafter will be printed only when there are sufficient changes in prices to warrant.

In the meantime a record is being kept in the Cleveland office of NPN and OILGRAM from which the publishers will be glad to make proofs, or letters or affidavits as to what the prices are, and without charge to regular subscribers. Changes in crude oil prices will be specially noted in this market section when made.

(*See NPN April 7, p. 47, 48 for latest tables*).

Crude Price Changes

Ohio Oil Co. increased price at wells for Elk Basin, Wyoming heavy crude 8c per barrel to $0.90, effective April 28.

Index of Governmental Orders Concerning Petroleum Prices

Orders, "requests", "ceilings", and other statements issued by governmental agencies concerning prices of petroleum and products, prices for which are published in this market section of NATIONAL PETROLEUM NEWS, have been published as follows:

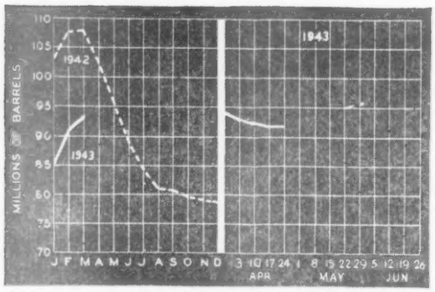
(For orders issued prior to February see earlier issues of NPN)

	NATIONAL PETROLEUM NEWS	PLATT'S OILGRAM	Platt's OIL-Law-GRAM
Feb. 8, '43—New tank wagon price formula set on basis of reference sellers	Feb. 10, p. 8	Feb. 8, p. 1	P. 300.112 P. 272.46
Feb. 12, '43—Ceiling set on Uniontown, Kentucky crude	Feb. 17, p. 20	Feb. 12, p. 1	P. 300.115
Feb. 15, '43—Specific ceilings set on tank wagon prices for Connecticut and New England distillates	Feb. 24, p. 12	Feb. 17, p. 1	P. 300.121 P. 272.49
Feb. 15, '43—Ceiling set for retail sales of distillates in containers at bulk plants in Boston area	Feb. 24, p. 12	Feb. 17, p. 2 Feb. 22, p. 2	P. 300.126
Feb. 16, '43—Tank wagon ceilings set for Michigan distillates	Feb. 24, p. 12	Feb. 16, p. 2	P. 300.117 P. 272.47
Feb. 19, '43—Pricing formula set up for industrial oils and greases	Feb. 24, p. 9	Feb. 18, p. 1	P. 300.129
Feb. 19, '43—Crude sent through Big Inch line exempt from price control	Feb. 24, p. 9	Feb. 23, p. 1	P. 300.136
Feb. 22, '43—Tank wagon increase set for distillates in New York City and vicinity	Mar. 3, p. 12	Feb. 22, p. 1	P. 300.137
Feb. 23, '43—Distillate Diesel ceilings set at 4 Gulf Coast ports	Feb. 24, p. 8	Feb. 23, p. 1	P. 300.135
Feb. 26, '43—Specific distillate ceilings set in Washington, D. C. and Baltimore tank wagon area	Mar. 10, p. 10	Mar. 1, p. 1	P. 300.139 P. 272.52
Feb. 26, '43—Specific ceilings set on Wyoming black crudes	Mar. 3, p. 20	Mar. 1, p. 1	P. 300.142
Mar. 3, '43—New ceilings for residuals and blends set up	Mar. 10, p. 10	Mar. 3, p. 2	P. 300.144
Mar. 16, '43—Fuel oil price increase of .3c extended to Washington and Oregon	Mar. 24, p. 9	Mar. 17, p. 2	P. 300.152 P. 272.54
Mar. 17, '43—Kerosine ceiling raised at Gulf Coast refineries and in District 1	Mar. 24, p. 10	Mar. 18, p. 1	P. 300.153 P. 272.55
Mar. 24, '43—Price basis for crude at well revised	Mar. 31, p. 12	Mar. 24, p. 1	P. 300.157
Mar. 26, '43—California crudes and residual ceiling increased 25c per bbl.	Mar. 31, p. 12	Mar. 26, p. 1	P. 300.159
Mar. 30, '43—Kerosine tank wagon ceiling raised .2c in Hartford, Conn. area	Apr. 7, p. 12	Mar. 30, p. 2	P. 300.167
Apr. 1, '43—California price increase extended to all levels in District 5	Apr. 7, p. 11	Apr. 1, p. 2	P. 300.164
Apr. 2, '43—.3c fuel oil increase extended to 20 Idaho counties	Apr. 7, p. 11	Apr. 3, p. 2	P. 300.169 P. 272.59
Apr. 6, '43—Only aviation gasoline with 87-octane rating or over exempt from price control	Apr. 14, p. 8	Apr. 6, p. 1	P. 272.58
Apr. 10, '43—Discount provisions revised	Apr. 14, p. 8	Apr. 12, p. 1	P. 300.170
Apr. 12, '43—All California crude prices increased	Apr. 14, p. 8	Apr. 12, p. 1	P. 300.172

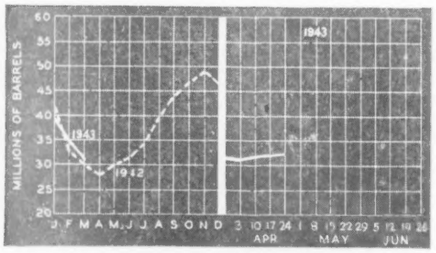
STATISTICS

Monthly figures are actual as reported by Bureau of Mines. Weekly figures are as estimated by American Petroleum Institute on Bureau of Mines basis, except crude stocks which are as reported by Bureau of Mines.

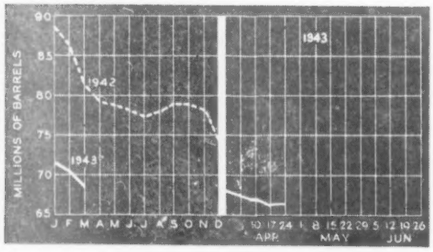
Gasoline Stocks (Finished and Unfinished)



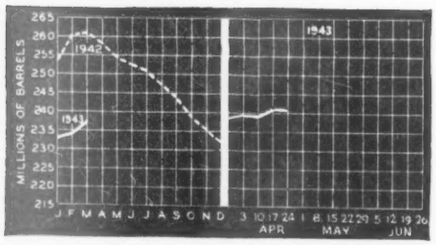
Gas Oil and Distillate Stocks



Residual Fuel Oil Stocks



Crude Stocks



Refinery Operations

(American Petroleum Institute figures in thousands of barrels of 42 gallons each. Figures include reported totals plus an estimate of unreported amounts and are therefore on a Bureau of Mines basis.)

Districts	Daily Potential Refining Capacity Week Ended Apr. 24	Daily Potential Refining Capacity Week Ended Apr. 17	Per Cent of Refining Capacity Reporting Week Ended Apr. 24	Per Cent of Refining Capacity Reporting Week Ended Apr. 17	Daily Average Crude Runs to Stills Week Ended Apr. 24	Daily Average Crude Runs to Stills Week Ended Apr. 17	Per Cent of Reporting Capacity Operated Week Ended Apr. 24	Per Cent of Reporting Capacity Operated Week Ended Apr. 17
Combined°°	2,444	2,444	88.7	88.7	1,667	1,665	68.2	68.1
Appalachian	177	177	84.8	84.8	159	154	89.8	87.0
Ind., Ill., Ky.	811	811	85.0	85.0	709	683	87.4	84.2
Okla., Kans., Mo.	416	416	80.1	80.1	350	339	84.1	81.5
Rocky Mt.	147	147	48.0	48.0	99	100	67.3	68.0
California	817	817	89.9	89.9	753	731	92.2	89.5
Total U. S.—B. of M. Basis	4,812	4,812	86.2	86.2	3,737	3,672	77.7	76.3
U. S.—B. of M. Basis Apr. 25, 1942					3,500			

Districts	Gasoline Production at Refineries inc. Natural Blended Week Ended Apr. 24	Gasoline Production at Refineries inc. Natural Blended Week Ended Apr. 17	Stocks of Finished and Unfinished Gasoline Week Ended Apr. 24	Stocks of Finished and Unfinished Gasoline Week Ended Apr. 17	Total Stocks Gas Oil & Distillates Week Ended Apr. 24	Total Stocks Gas Oil & Distillates Week Ended Apr. 17	Total Stocks Residual Fuel Oil Week Ended Apr. 24	Total Stocks Residual Fuel Oil Week Ended Apr. 17
Combined°°	4,873	4,655	38,932	39,771	13,879	13,600	10,235	10,165
Appalachian	419	393	2,576	2,535	799	830	452	455
Ind., Ill., Ky.	2,161	2,210	19,326	19,692	3,433	3,475	2,565	2,436
Okla., Kans., Mo.	1,057	1,000	7,044	7,130	1,616	1,632	1,395	1,345
Rocky Mt.	326	307	2,089	2,063	347	343	510	495
California	1,747	1,805	21,147	20,930	11,068	11,046	52,298	52,111
Total U. S.—B. of M. Basis	10,583	10,370	91,114	92,121	31,142	30,926	67,455	67,007
U. S.—B. of M. Basis April 25, 1942	10,542		103,359		28,407		80,374	

°Finished 80,918,000 bbl.; Unfinished 10,196,000 bbl.
°°Includes East Coast, Inland Texas, Texas Gulf, Louisiana Gulf, and North Louisiana-Arkansas districts

Crude Oil Stocks

(Bureau of Mines Figures in thousands of barrels)

Grade or Origin	Apr. 17	Apr. 24	Change from Apr. 17
Pennsylvania Grade	2,770	2,740	— 30
Other Appalachian	1,507	1,493	— 14
Lima-Michigan	945	1,026	+ 81
Illinois-Indiana	11,658	11,425	—233
Arkansas	2,233	2,314	+ 81
Kansas	8,810	9,004	+194
Louisiana:	14,489	14,595	+106
Northern	4,590	4,664	+ 74
Gulf Coast	9,899	9,931	+ 32
Mississippi	1,316	1,352	+ 36
New Mexico	6,923	6,985	+ 62
Oklahoma	38,425	37,931	—494
Texas:	104,434	105,691	+1,257
East Texas	23,733	23,456	—277
West Texas	24,494	24,889	+395
Gulf Texas	29,407	29,853	+446
Other Texas	26,800	27,493	+693
Panhandle	5,480	5,594	+114
North	7,163	7,434	+271
South	4,511	4,763	+252
Other	9,646	9,702	+ 56
Rocky Mountain	13,730	13,613	—117
California	34,089	33,807	—282
Foreign	92	59	— 33
Total gasoline-bearing in U. S.	241,421	242,035	+614
Heavy in California	10,477	10,404	— 73

N.P.N. Gasoline Index

	Dealer T.W.	Tank Car
	Cents Per Gal.	
May 3	10.57	6.75
Month ago	10.57	6.69
Year ago	10.46	6.58

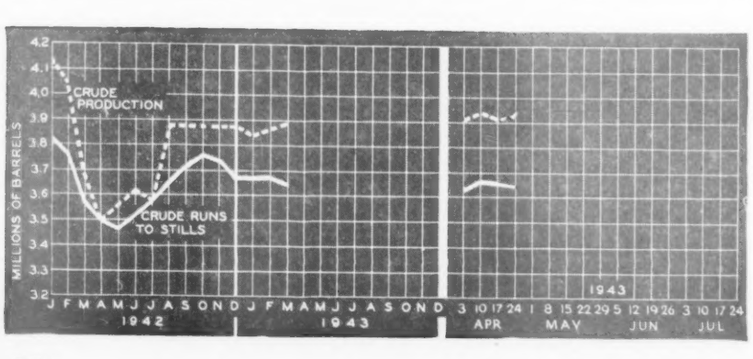
Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is weighted average of following wholesale markets for regular-grade gasoline, FOB refineries or terminals: Okla., Mid-Western, W. Penna., Calif., N. Y. Harbor, Philadelphia, Jacksonville, Boston and Gulf Coast.

Pennsylvania Crude Runs

(Compiled by National Petroleum Assn. from reports of all companies which refined Pennsylvania crude. Figures in barrels.)

Week Ended	Daily Average	Week Ended	Daily Average
Jan. 2	75,279	Mar. 6	70,389
Jan. 9	70,842	Mar. 13	73,184
Jan. 16	78,155	Mar. 20	77,828
Jan. 23	77,551	Mar. 27	82,224
Jan. 30	74,034	Apr. 3	81,095
Feb. 6	67,494	Apr. 10	74,317
Feb. 13	69,103	Apr. 17	70,445
Feb. 20	78,797	Apr. 24	76,625
Feb. 27	77,285	1942 Low	67,243
		1942 High	87,251



U. S. Crude Oil Production

(American Petroleum Institute figures)

	WEEK ENDED Apr. 24 Barrels (Daily Average)	WEEK ENDED Apr. 17 Barrels (Daily Average)		WEEK ENDED Apr. 24 Barrels (Daily Average)	WEEK ENDED Apr. 17 Barrels (Daily Average)
Oklahoma	341,450	339,850	Eastern (Ill., Ky., & Ind. excluded)	75,700	71,650
Kansas	318,800	310,300	Kentucky	21,150	21,200
Nebraska	2,200	2,150	Michigan	57,100	59,400
Texas	1,389,150	1,389,000	Wyoming	92,300	92,200
Louisiana	346,300	346,200	Montana	20,250	20,250
Arkansas	72,200	71,650	Colorado	6,850	6,450
Mississippi	53,650	56,750	New Mexico	97,250	97,250
Illinois	225,250	221,050	California	780,700	787,500
Indiana	12,300	14,250	Total U. S.	3,912,600	3,907,100

REFINERY and SEABOARD PRICES

In bulk lots by Motor Transport, Tank Car, Barge or Tanker as shown

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

HOW PRICES ARE REPORTED—

Refinery and Seaboard prices in National Petroleum News are gathered by PLATT'S OILGRAM and are published in the Monday issue of the OILGRAM.

PLATT'S OILGRAM is a reporting service issued in three identical editions daily from News Bureaus at New York, Cleveland, and Tulsa, Okla. PLATT'S OILGRAM gathers and publishes what its publisher and representatives believe to be accurate news of sales, prices and current happenings affecting the oil industry and that will be of interest to its subscribers. As this information is usually private, OILGRAM reports it according to what it is able to obtain from sources deemed reliable.

All information is supplied without guarantee as to its completeness, accuracy, time of transmission or promptness of delivery.

The subscriber receives this information for his private use and not for resale or further distribution.

Publisher reserves the right to change the extent, nature and form of showing this information at any time.

Prices shown in the tables are quotations (meaning sellers' general offers or posted prices), or actual sales prices, reported to OILGRAM by refiners for "open spot" transactions, except as otherwise specified.

Prices arrived at by discounts off a specified price or "market date of shipment," prices named in contracts or prices arrived at in accordance with any arrangement made prior to date of sale, are not for "open spot" transactions and therefore are not considered in making the price tables. Prices made to brokers and prices in "Inter-refinery" transactions are also not considered except as may be noted.

All prices are for "immediate" shipment except in Gulf Coast bulk transactions where shipment is generally to be made in ninety days. Prices are FOB refineries, pipelines, or tanker terminals in districts designated.

Prices shown are for quantities in bulk such as tank car lots, motor transport lots or barge lots; and in cents per gallon; heavy fuel oils are in dollars per barrel of 42 U.S. gallons; wax and petrolatums are in cents per pound. Prices applying to barges or cargoes only are so designated.

Prices do not include taxes or inspection fees. Prices are published at the close of the business day.

Mid-Western prices in the tables were gathered from refiners with offices located in Chicago and the surrounding territory. While the prices are quoted on a Group 3 (Oklahoma) freight basis, this is in accordance with the custom of the oil industry which uses Group 3 as a price basis for the ease of comparing prices even when the material originates in another refining district. Other refinery prices are given by and for the particular refining district where the material is made and from which it is shipped.

When prices obtained by OILGRAM do not conform to these conditions the exception and the new conditions are noted in the news lead or in conjunction with the price table by footnote or otherwise, for the particular refinery or sales district involved.

Crude oil and products covered by OILGRAM'S news and price service, except where noted, have been represented to the publisher as fully up to the customary trade specifications indicated and according to the generally accepted methods of test: and all crude oil and all products thereof as having been lawfully produced and transported.

Any apparent error should be reported to the nearest OILGRAM or National Petroleum News office at once as no correction will be made after the second issue of the OILGRAM or National Petroleum News following its publication.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Summary of Daily Gasoline Prices (April 26 to May 3)

U. S. Motor, (ASTM octane)	Monday May 3	Friday Apr. 30	Thursday Apr. 29	Wednesday Apr. 28	Tuesday Apr. 27
78 octane Ethyl:					
Oklahoma	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875	6.75 – 6.875
Mid-Western (Group 3 basis)	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125	6.75 – 7.125
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7	6.6 – 7
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	7 (2)	7(2)	7(2)	7(2)	7(2)
72-74 octane:					
Oklahoma	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
Mid-Western (Group 3 basis)	5.875– 6	5.875– 6	5.875– 6	5.875– 6	5.875– 6
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.8 – 6	5.8 – 6	5.8 – 6	5.75 – 6	5.75 – 6
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	6	6	6	6	6
63-66 octane:					
Oklahoma	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
Mid-Western (Group 3 basis)	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625	5.5 – 5.625
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.4 – 5.5	5.4 – 5.5	5.4 – 5.5	5.4–5.625 (a)	5.4–5.625 (a)
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.75(1)	5.75(1)	5.75(1)	5.75(1)	5.75(1)
60 octane & above:					
Oklahoma	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25	5.125– 5.25
Mid-Western (Group 3 basis)	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25	5.1 – 5.25
N. Tex. (For shpt. to Tex. & N. M. dest'ns.)	4.875– 5.25	4.875– 5.25	5.875– 5.25	4.875– 5.25	4.875– 5.25
W. Tex. (For shpt. to Tex. & N. M. dest'ns.)	5.25	5.25	5.25	5.25	5.25
Motor Gasoline, 72-74 octane (ASTM)					
New York harbor	9.2 – 9.4	9.2 –10.2	9.2 –10.2	9.2 –10.2	9.2 –10.2
New York harbor, barges	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3	9.1 – 9.3
Philadelphia district	9.2	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7	9.2 – 9.7
Baltimore district	8.95	8.95	8.95	8.95	8.95
Motor Gasoline:					
Western Penna. Bradford-Warren:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5–8.95	7.5–7.75(2)	7.5–7.75(2)	7.5–7.75(2)	7.5–7.75(2)
Western Penna. Other Districts:					
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3	7.25 – 7.3

REFINERY PRICES

Gasoline—U. S. Motor (ASTM) except where otherwise specified

Prices in Effect	May 3	Apr. 26
OKALHOMA		
78 oct. Ethyl	6.75 – 6.875	6.75 – 6.875
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.125– 5.25	5.125– 5.25
60-62, 400 e.p.	5.125 (1)	5.125 (1)
MID-WESTERN (Group 3 basis)		
78 oct. Ethyl	6.75 – 7.125	6.75 – 7.125
72-74 oct.	5.875– 6	5.875– 6
63-66 oct.	5.5 – 5.625	5.5 – 5.625
60 oct. & below	5.1 – 5.25	5.1 – 5.25
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	6.6 – 7	6.6 – 7
72-74 oct.	5.8 – 6	5.8 – 6
63-66 oct.	5.4 – 5.5	5.4 – 5.5
60 oct. & below	4.875– 5.25	4.875– 5.25
60-62, 400 e.p.	5.375 (1)	5.375 (1)
W. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
78 oct. Ethyl	7 (2)	7 (2)
72-74 oct.	6	6
63-66 oct.	5.75 (1)	5.75 (1)
60 oct. & below	5.25	5.25
CENT. W. TEX. (Prices to truck transports)		
80 oct. & above	7 (2)	7 (2)
72-74 oct.	5.875 (2)	5.875 (2)
67-69 oct.	5.375 (1)	5.375 (1)
62 oct. & below	5.125 (2)	5.125 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
60 oct. & below	No Price	No Price
60-62, 400 e.p.	No Price	No Price
KANSAS (For Kansas destinations only)		
78 oct. Ethyl	7.25 (1)	7.25 (1)
72-74 oct.	6 –6.2 (2)	6 –6.2 (2)
63-66 oct.	5.625–5.8 (2)	5.625–5.8 (2)
60 oct. & below	5.25 –5.4 (2)	5.25 –5.4 (2)

Prices in Effect	May 3	Apr. 26
ARK. (For shipment to Ark. & La.)		
72-74 oct., leaded	6 (1)	6 (1)
70-72 oct. "	5.875 (1)	5.875 (1)
62 oct. "	5.5 (1)	5.5 (1)
60 oct. & below, unleaded	5.375 (1)	5.375 (1)
WESTERN PENNA. (Motor gasoline)		
Bradford-Warren:		
"Q" Gasoline, Min. 70 Oct. (ASTM)	7.5 – 8.95	7.5 – 8.95
Other districts:		
"Q" Gasoline Min. 70 Oct. (ASTM)	7.25 – 7.3	7.25 – 7.3
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
U.S. Motor: (Oct. ASTM):		
72-74 oct.	8 – 8.5	8 – 8.5
67-69 oct.	7.5 (1)	7.5 (1)
Str. run gasoline, excluding Detroit shpt.	5.5 – 6	5.5 – 6
OHIO (S. O. Ohio quotations for statewide delivery and subject to exceptions for local price disturbances)		
72-74 oct.	8.375	8.375
CALIFORNIA U.S. Motor:		
78 oct. & above (Ethyl)	6.5 – 8.75	6.5 – 8.75
70-75 oct. (regular)	6 – 7.75	6 – 7.75
65 oct. & below (3rd grade)	5 – 6.75	5 – 6.75

Kerosine, & Gas Fuel Oils

Prices in Effect	May 3	Apr. 26
OKLAHOMA		
41-43 grav. w.w.	4.375– 4.5	4.375– 4.5
42-44 grav. w.w.	4.5	4.5
Range Oil	4 – 4.125	4 – 4.125
No. 1 P.W.	3.875	3.875
No. 1 straw	3.875–4 (1)	3.875–4 (1)
No. 2 straw	3.625	3.625
No. 3 fuel	3.5 (2)	3.5 (2)
U. G. I. Gas Oil	3.625–3.75 (1)	3.625–3.75(1)
No. 6 fuel	....	....
14-16 fuel	$0.97	$0.97
MID-WESTERN (Group 3 basis)		
41-43 grav. w.w.	4.375	4.375
42-44 grav. w.w.	4.5	4.5
Range Oil	4 (2)	4 (2)
No. 1 p.w.	3.875 (1)	3.875 (1)
No. 2 straw	3.625	3.625
No. 3	3.5 (2)	3.5 (2)
No. 5	$0.85 (1)	$0.85 (1)
No. 6	$0.80 (1)	$0.80 (1)
N. TEX. (For shpt. to Tex. & N. M. dest'ns.)		
41-43 grav. w.w.	4.25 – 4.75	4.25– 4.75
No. 1 P.W.	4.1 –4.2 (2)	4.1 –4.2 (2)
AMARILLO, TEX. (For shpt. to W. Okla. & Tex. differential territory.)		
41-43 grav. w.w.	No Price	No Price
No. 1 straw	No Price	No Price
KANSAS (For Kansas destinations only).		
41-43 grav. w.w.	No Price	No Price
42-44 grav. w.w.	4.7–4.875 (2)	4.7–4.875 (2)
No. 1 p.w.	4.1–4.25 (2)	4.1–4.25 (2)
No. 6 fuel	$0.85 (1)	$0.85 (1)

REFINERY PRICES (Continued)

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Kerosine, & Gas Fuel Oil

(Continued)

Prices in Effect	May 3	Apr. 26
ARK. (For shipment to Ark. and La.)		
41-43 grav. w.w.	4.625 (1)	4.625 (1)
No. 1	4 (1)	4 (1)
No. 2	3.5 (1)	3.5 (1)
No. 3 fuel	3.5 (1)	3.5 (1)
Tractor fuel, for shipt to Ark. points only	5.125 (1)	5.125 (1)
WESTERN PENNA.		
Bradford-Warren:		
45 grav. w.w.	6.55 – 8.05	6.55– 8.05
46 grav. w.w.	6.675 (1)	6.675 (1)
No. 1 fuel	6.55 – 8.05	6.55 – 8.05
No. 2 "	6.625-7.625 (2)	6.625-7.625(2)
No. 3 "	6.625-7.75 (2)	6.625-7.75 (2)
36-40 gravity	6.625-6.75 (2)	6.625-6.75(2)
Other districts:		
45 grav. w.w.	6.75 – 7.925	6.75 – 7.925
46 grav. w.w.	6.75 – 6.925	6.75 – 6.925
47 grav. w.w.	6.875– 7.05	6.875– 7.05
No. 1 fuel	6.5 – 6.675	6.5 – 6.675
No. 2 "	6.5 – 7.125	6.25 – 7.125
No. 3 "	6.5 – 7.125	6.25 – 7.125
36-40 grav., Pittsburgh dist. prices excluded	6.5 – 7	6.25 – 7
CENTRAL MICHIGAN (FOB Central Mich. refinery group basis for shpt. within Mich.; shpts. may originate at plants outside Central group.)		
47-49 gravity w.w.	5.8 – 6	5.8 – 6
P.W. Distillate	5.5	5.5
No. 3 gas oil, Straw	5	5
U.G.I. gas oil	4.5 (2)	4.5 (2)
Fuel Oils (Vis. at 100)		
300-500 Vis.	...	...
100-300 Vis.	4.5	4.5
OHIO (S. O. quotations for statewide delivery)		
Kerosine	7	7
CALIFORNIA		
40-43 grav. w.w.	5 – 7	4.5 – 7
San Joaquin Valley:		
Heavy fuel	$1.10 (2)	$1.10 (2)
Light fuel	$1.20 (2)	$1.20 (2)
Diesel fuel	4 (2)	4 (2)
Stove dist.	3 – 5 (2)	3 – 5 (2)
Los Angeles:		
Heavy fuel	$1.10 (2)	$1.10 (2)
Light fuel	$1.20 (2)	$1.20 (2)
Diesel fuel	3.5– 4	3.5– 4
Stove dist.	3 – 5	3 – 5 (2)
San Francisco:		
Heavy fuel	$1.15 (1)	$1.15 (1)
Light fuel	$1.25 (1)	$1.25 (1)
Diesel fuel	4.5 (1)	4.5 (1)
Stove dist.	5.5 (1)	5.5 (1)

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Lubricating Oils

WESTERN PENNA.

Prices are for sales made, or offers reliably reported, to jobbers & compounders only.

Viscous Neutrals—No. 3 col. Vis. at 70°F.

200 Vis. (180 at 100°) 420-425 fl.		
0 p.t.	31.5 (1)	31.5 (1)
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	23-26 (b)	23-26 (b)
150 Vis. (143 at 100°) 400-405 fl.		
0 p.t.	29.5 (1)	29.5 (1)
10 p.t.	28.5 (1)	28.5 (1)
15 p.t.	27.5 (1)	27.5 (1)
25 p.t.	21-24 (b)	21-24 (b)

(b) Offered by Mid-Western sales agent at 1c off low.

Cylinder Stocks

Brt. stk., 145-155 vis. at 210°, 540-550 fl., No. 8 col.		
10 p.t.	30.5 (1)	30.5 (1)
15 p.t.	29.5 (1)	29.5 (1)
25 p.t.	25	25
600 S.R. filterable	15	15
650 S.R.	15.5	15.5
600 fl.	16	16
630 fl.	17	17

MID-CONTINENT (F. o. b. Tulsa)

Neutral Oils (Vis. at 100° F. 0 to 10 P.P.)

Pale Oils:

Vis. Color		
60-85—No. 2	8	8
86-110—No. 2	8.5 (2)	8.5 (2)
150—No. 3	14.5	14.5
180—No. 3	15	15
200—No. 3	15	15
250—No. 3	16-16.5	16-16.5
280—No. 3	17	17
300—No. 3	18 (2)	18 (2)

Lubricating Oils (Cont'd)

Prices in Effect	May 3	Apr. 26
Red Oils:		
180—No. 5	15 (1)	15 (1)
200—No. 5	15 (1)	15 (1)
280—No. 5	No Price	No Price
300—No. 5	17.5 (2)	17.5 (2)

Note: Viscous Neutrals, 15-25 p.p. generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p.; generally are quoted 0.25c under 0-10 p.p. oils.

Bright Stock—Vis. at 210°		
200 Vis. D	27 (1)	27 (1)
150-160 Vis. D:		
0 to 10 p.p.	23	23
10 to 25 p.p.	22.5–23	22.5–23
25 to 40 p.p.	23 (1)	23 (1)
150-160 Vis. E	22 (1)	22 (1)
120 Vis. D:		
0 to 10 p.p.	22 (2)	22 (2)
600 S.R. Dark Green	8.5 (1)	8.5 (1)
600 S.R. Olive Green	10–11	10–11
631 S.R.	18.5 (1)	18.5 (1)
Black Oil	5.5 (1)	5.5 (1)

QUALIFYING PRICE NOTE: These lube prices are posted prices from which refiners allow special discounts to meet varying local competition. Discounts vary from day to day as government takes increasing proportion of lubes. Discounts, where products can be had, any run to 2c on bright stocks and 3c on neutrals.

SOUTH TEXAS Neutral Oils

Vis. Color		
Pale Oils: (*Vis. at 100°F.*)		
100 No. 1½-2½	6.5	6.5
200 No. 2-3	8.75	8.75
300 No. 2-3	9.25	9.25
500 No. 2½-3½	10	10
750 No. 3-4	10.25	10.25
1200 No. 3-4	10.375	10.375
2000 No. 4	10.5	10.5
Red Oils:		
100 No. 5-6	6.5 (2)	6.5 (2)
200 No. 5-6	8.75	8.75
300 No. 5-6	9.25	9.25
500 No. 5-6	10	10
750 No. 5-6	10.25	10.25
1200 No. 5-6	10.375	10.375
2000 No. 5-6	10.5-11.5	10.5-11.5

CHICAGO (From Mid-Continent p.l. crude.)

Neutral oils (Vis. at 100° F. 0 to 10 p.p.)

Pale Oils

Vis. Color		
60-85—No. 2	9.5 (1)	9.5 (1)
86-110—No. 2	10 (1)	10 (1)
150—No. 3	15.5 (1)	15.5 (1)
180—No. 3	16 (1)	16 (1)
200—No. 3	16 (1)	16 (1)
250—No. 3	17	17
Red Oils:		
180—No. 5	16 (1)	16 (1)
200—No. 5	16 (1)	16 (1)
250—No. 5	17 (1)	17 (1)
280—No. 5	18 (1)	18 (1)
300—No. 5	18.5 (1)	18.5 (1)

Note: Viscous oils, 15 to 30 p.p. are quoted 0.5c lower; 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., 0.25c lower.

Unfiltered Steam Refined: (Viscosity at 210°)		
140	11.5 (1)	11.5 (1)
160	12.5 (1)	12.5 (1)
200	13.5 (1)	13.5 (1)
Bright stocks, 160 vis. at 210 No. 8 color:		
0 to 10 p.p.	24 (1)	24 (1)
15 to 25 p.p.	23.5 (1)	23.5 (1)
30 to 40 p.p.	21.5 (1)	21.5 (1)
E filtered Cyl. Stock	15.5 (1)	15.5 (1)

Note: To obtain prices delivered in Chicago, add 0.25c per gal.

Natural Gasoline

(Group 3 & Breckenridge prices are to blenders on freight basis shown below. Shipments may originate in any Mid-Continent manufacturing district.)

FOB GROUP 3		
Grade 26-70	3.875 (Qtns.)	3.875 (Qtns.)
FOB BRECKENRIDGE		
Grade 26-70	3.5 (Qtns.)	3.5 (Qtns.)
CALIFORNIA (FOB plants in Los Angeles basin)		
21 pound vapor pressure for blending	4.75 – 5.375	4.75 – 5.375

Naphtha and Solvent

Prices in Effect	May 3	Apr. 26
(FOB Group 3)		
Stoddard solvent	6.625	6.625
Cleaners' naphtha	7.125	7.125
V. M. & P. naphtha	7.125	7.125
Mineral spirits	6.125	6.125
Rubber solvent	7.125	7.125
Lacquer diluent	7.375– 8.125	7.375– 8.125
Benzol Diluent	8.375– 8.625	8.375– 8.625
WESTERN PENNA.		
Bradford-Warren District:		
Stoddard Solvent	7.5 (1)	7.5 (1)
Other Districts:		
Untreated naphtha	7 (2)	7 (2)
Stoddard solvent	7 – 7.25	7 – 7.25
OHIO (S. O. quotations for statewide delivery):		
V.M.&P. naphtha, D.C. naphtha, Varnolene & Sohio solvent	10	10
Rubber solvent	9	9

Wax

White Crude Scale:

WESTERN PENNA. (Bbls. C.L.)		
122-124 A.m.p.	4.25 (2)	4.25 (2)
124-126 A.m.p.	4.25	4.25
OKLAHOMA (C.L. FOB Refinery)		
Semi-refined:		
128 AMP min., white, 50 kilo bags	No Price	No Price
132-134 AMP, bbls.	5.25 (1)	5.25 (1)

CHICAGO (FOB Chicago district refinery of one refiner, in bags, carloads. Carloads, slabs loose 0.4c less. Melting points are EMP (ASTM) methods; add 3° to convert into AMP.)

Fully refined:		
122-124 (bags only)	5.6	5.6
125-127	6	6
127-129	6.25	6.25
130-132	6.55	6.55
132-134	6.8	6.8
135-137	7.55	7.55

Petrolatums

WESTERN PENNA. (Bbls., carloads; tank cars, 0.5c per lb. less.)		
Snow White	6.125– 7.25	6.125– 7.25
Lily White	5.375– 6.125	5.375– 6.125
Cream White	4.375– 5.125	4.375– 5.125
Light Amber	3.375– 3.875	3.375– 3.875
Amber	3.125– 3.5	3.125– 3.5
Red	3 – 3.25	3 – 3.25

Group 3 Freight Rates

To Division Headquarters Points of Standard Oil Co. of Indiana

(Cents Per Gal.)

	Gasoline Kerosine	*Distillate Fuel Oil	Gas Oil and or Residual Fuel Oil
Chicago, Ill.	2.508	2.508	2.516
Decatur, Ill.	2.244	2.244	2.442
Joliet, Ill.	2.508	2.508	2.516
Peoria, Ill.	2.310	2.310	2.442
Quincy, Ill.	2.178	2.178	2.294
Indianapolis, Ind.	2.640	3.034	3.034
Evansville, Ind.	2.442	2.886	2.886
South Bend, Ind.	3.135	3.135	3.330
Detroit, Mich.	4.290	3.996	3.996
Grand Rapids, Mich.	3.828	3.828	3.922
Saginaw, Mich.	4.290	4.144	4.144
Green Bay, Wis.	2.838	2.838	3.182
Milwaukee, Wis.	2.706	2.706	2.738
La Crosse, Wis.	2.574	2.574	2.886
Minneapolis-St. Paul	2.574	2.574	2.886
Duluth, Minn.	2.838	2.838	3.256
Mankato, Minn.	2.574	2.574	2.886
Des Moines, Ia.	2.046	2.046	2.294
Davenport, Ia.	2.310	2.310	2.442
Mason City, Ia.	2.376	2.376	2.664
St. Louis, Mo.	2.046	2.046	2.072
Kansas City, Mo.	1.518	1.518	1.776
St. Joseph, Mo.	1.518	1.518	1.776
Fargo, N. D.	3.564	3.564	3.996
Huron, S. D.	3.036	3.036	3.330
Whichita			
From Ponca City	0.528	0.528	0.592
From Tulsa	0.858	0.858	0.962
From Cushing	0.792	0.792	0.888

*Not suitable for illuminating purposes.

SEABOARD PRICES EXPORT AND COASTWISE

NOTE—Parenthetical figures after prices indicate number of companies quoting when less than three companies are quoting.

NOTICE—Owing to great demand, refiners generally limit quotations to regular customers and refuse bids, though higher, from others. Refiners' prices and sales shown; bids reported in market leads.

Atlantic Coast

(Prices are of refiners, FOB their refineries & their tanker terminals, & of tanker terminal operators FOB their terminals)—Prices In Effect May 3

MOTOR GASOLINE

District:	Min. 80 Oct. '39 Research (Max. 2 cc Lead)	72-74 Oct. (ASTM)	68-70 Oct. (ASTM)
N. Y. Harb.	....	9.2 – 9.4	9.2(1)
N. Y. Harb., barges	....	9.1 – 9.3	9.1(1)
Albany	....	9.3 – 9.5	....
Philadelphia	....	9.2	....
Baltimore	....	8.95	8.85(1)
Norfolk	....	8.7 – 8.9	8.5(1)
Wilmington, N. C.	....	8.7 – 8.8	8.5(1)
Charleston	....	8.7(2)	8.1(1)
Savannah	....	8.25–8.4(2)	....
Jacksonville	....	8.275(1)	....
Miami	....	....	....
Tampa	....	8.27 – 8.4	8.275(1)
Pensacola	....	7 –7.2(1)	6.6–6.8(1)
Mobile	....	7 – 7.2	6.6–6.8(1)
New Orleans	....	6.125– 6.75	....
Portland	....	9.5 – 9.65	....
Boston	....	9.4 – 9.7	9.7(1)
Providence	....	9.4 – 9.7	....

FUEL OILS

	KEROSINE and /or NO. 1 FUEL	No. 2	No. 3	No. 5	No. 6
N. Y. Harb.	7.1	6.7	6.7	$1.95–$2.01 (a)	$1.65– $2.07
N. Y. Harb., barges	7	6.6	6.6	....	....
Albany	7.3	6.8	6.8(2)	$2.25(1)	$1.85–$2.27 (1)
Philadelphia	7.2	6.7	6.7	$1.98	$1.65–$2.07
Baltimore	7.2	6.7	6.7	....	$1.65–$2.07
Norfolk	7.1	6.7	6.7(1)	....	$1.65-2.07(2)
Wilmington, N. C.	7.05	6.7	....	....	....
Charleston	7.2	6.7(2)	....	....	$1.60–$2.07 (2)
Savannah	7.05(2)	....	....	....	$1.60-2.02(1)
Jacksonville	7.05(1)	6.25	....	....	$1.60-2.02(1)
Miami	7.05(1)	....	....	....	....
Tampa	7.05	6.25(2)	....	....	$1.50–$1.92 (1)
Pensacola	4.8 (1)	....	....	....	....
Mobile	4.75–5.05 (2)	....	....	....	....
New Orleans	4.25 – 4.75	3.75(2)	....	$1.27(1)	$0.85–$1.27 (2)
Portland	7.3	6.8	6.8(2)	$2.25(1)	$1.65–$2.07 (1)
Boston	7.2	6.7	6.7(2)	$1.95–$2.07 (2)	$1.65–$2.07
Providence	7.2	6.7	6.7(2)	$1.90–$1.95 (2)	$1.65–$2.07

(a) This price is for a straight-run low pour test No. 5 fuel.

	Bunker C Fuel Ships' bunkers (Ex Lighterage)	Diesel Oil Ships' bunkers (Ex Lighterage)	Diesel Oil Shore Plants	Gas House Gas Oil 28-34 Gravity
N. Y. Harbor	$1.65–$2.07	$2.78	6.7–6.8(2)	6.8(2)
Albany	$1.85(1)	$2.98(1)	6.8(1)	7(1)
Philadelphia	$1.65-$2.07	$2.78	....	....
Baltimore	$1.65 –$2.07	$2.78	6.7(1)	6.7(1)
Norfolk	$1.65 –$2.07	$2.78	6.7(1)	6.7(1)
Charleston	$1.60 –$2.02	$2.78(2)	6.7(1)	6.7(1)
Savannah	$1.60–$2.02 (1)	$2.62(1)	....	....
Jacksonville	$1.60–$2.02 (2)	$2.62(2)	....	....
Tampa	$1.50–$1.92	$2.62(2)	....	....
New Orleans	$0.97–$1.09	$1.65(1)	4(1)	....
Portland	$1.65–$2.07 (1)	$2.86(2)	6.8(1)	6.9(1)
Boston	$1.65–$2.07	$2.78	6.7(2)	6.8(2)
Providence	$1.65–$2.07	$2.78(2)	6.7(1)	6.8(1)

Residual fuel prices generally vary with A.P.I. specifications from range low for 9.9 & below degrees to range high for 25.0 & above.

Pacific Export

(Quotations at seaboard, Los Angeles, cargo lots, except where otherwise noted.)

Prices in Effect	May 3	Apr. 26
375 e.p. blend, 70 oct.	No Price	No Price
390 e.p. blend, 68 oct.	No Price	No Price
390 e.p. blend, 66 oct.	No Price	No Price
400 e.p. blend, 65 oct. min.	No Price	No Price
U. S. Motor, under 65 oct.	No Price	No Price
38-40 grav., w.w. kero., 150 fire point	No Price	No Price
41-43 grav., w.w. kero.	No Price	No Price
44 grav. w.w. kero	No Price	No Price
Diesel fuel, 24 & above	No Price	No Price
Diesel fuel, under 24	No Price	No Price
30-34 grav. diesel (gas oil) Pac. Spec. 200	No Price	No Price
Grade C fuel, Pac. Spec. 400	No Price	No Price

In Ship's Bunkers, or deep tank lots:

Diesel Fuel, Pac. Spec. 200	$1.40 –$1.45	$1.40 –$1.45
Grade C fuel, Pac. Spec. 400	$0.825–$0.85	$0.825–$0.85

Cased Goods: (Per case)

375-400 e.p. blend, 65 oct. & above	No Price	No Price
400 e.p. blend under 65 oct.	No Price	No Price
U. S. Motor	No Price	No Price
40-43 grav., w.w. kero., 150 fire point	No Price	No Price
Kero., p.w.	No Price	No Price

MID-CONTINENT LUBES

(At Gulf; in packages, FAS.; in bulk, FOB terminals)

Prices in Effect May 3

	Steel Drums	Bulk
200 Vis. D 210 brt. stock	35 (1)	28.8 (1)
150 vis. D 210 brt. stock 0-10 p.p.	31 (1)	24.8 (1)
10-25 p.p.	....	....
100 vis. D 210 brt. stock 0-10 p.p.	....	....
10-25 p.p.	....	....
200 vis. No. 3 col. neutral: 0-10 p.p.	....	....

Wax

(Melting points are AMP, 3° higher than EMP. Prices are FOB refinery and do not include bag, freight or export differentials).

Prices In Effect May 3

Crude Scale	New Orleans Export	N. Y. Domestic	N. Y. Export
124-6 Yellow	4.25 (1)	....	4.25 (1)
122-4 White	....	4.25 (2)	4.25 (2)
124-6 White	4.25 (1)	4.25	4.25
Fully Refined:			
123-5	5.2 (1)	5.2 (2)	5.2 (1)
125-7	5.2 (1)	5.2 (2)	5.2 (1)
128-30	5.6 (1)	5.6	5.6 (1)
130-32	5.85 (1)	5.85 (2)	5.85 (1)
133-5	6.15 (1)	6.15	6.15 (1)
135-7	6.4 (1)	6.4 (1)	6.4 (1)

Tanker Rates

(Approximate last paid rates, cents per bbl.; Gulf-N. Atlantic, not East of N. Y.)

Hvy. Crude & Fuel (10 to 19.9 gravity)	48
Light Crude, (30 grav. or Lighter)	43
Gasoline	40
Kerosine	40
No. 2 Fuel	42

Note: 200% surcharge permitted on above rate by War Shipping Administration "to cover increased wartime operating expenses."

Gulf Coast

Prices in Effect May 3

	New Orleans & Lower Mississippi to Baton Rouge Tank Cars	New Orleans & Lower Mississippi to Baton Rouge Barge	Texas Gulf Coast South of New Orleans Tank Cars	Texas Gulf Coast South of New Orleans Barges	CARGOES Domestic & Export From all Gulf Ports
MOTOR GASOLINE					
Leaded (oct. by ASTM)					
80 oct. min. Max. 3 cc lead	6.5 – 7	6.5 – 6.75	6.75 – 6.9	6.75 – 6.9	6 – 6.9
72-74 oct.	6.125	5.75–6.125	5.75	5.75	5.75
63-65 oct.	....	....	5.35	5.35	5.35
Unleaded 70 oct.	....	....	....	....	5.625– 5.75
67-68 oct.	....	....	....	....	5.5 – 5.625
65 oct.	....	5.25	....	....	5.25
60 oct.	....	....	....	....	5
KEROSINE & LIGHT FUELS					
41-43 w.w. kero	4.125–4.75(a)	4.125– 4.75	4.125– 4.25	4.125	4.125
42-44 w.w. kero	....	....	4.125	4.125	4.125
No. 2 fuel oil	3.75	3.75	3.75 – 4	3.75	3.75
DIESEL & GAS OILS					
(In diesel index No.)					
Below 43 di	....	....	....	....	3.75
43-47 di	....	....	....	....	3.875– 4
48-52 di	4	4	4	4	4–4.125
53-57 di	4.125	4.125	4.125	4.125	4
58 and above	....	....	....	....	4.25

Above products in Truck Transports of 2,400 gal. and over ½c above Tank Car Prices.

NOTE—Prices for heavy fuel vary within the range given above according to gravity from 9.9 grav. and below to 25 B and above.

Naphtha

Prices in Effect May 3

	V.M.&P. Naphtha	Mineral Spirits
New York Harbor	11 (2)	10
Philadelphia district	11 (2)	10
Baltimore	10.5 (2)	9.5
Boston	11.5 (2)	10.5
Providence	11.5 (1)	10.5 (2)

HEAVY FUELS & BUNKER OILS (At all Gulf Ports)	In Cargoes	In Ship's Bunkers (Ex. lighterage)
Heavy Diesels		
Below 28 API Grav.	....	....
28 API Grav. & Above	....	$1.65
Bunker C Oil	$0.85–$1.27	$0.85 –$1.27

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect May 3, 1943 as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. New Jersey

	Esso (*Regular Grade*) Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
*Atlantic City, N. J.	10.2	10.7	4.5	10
*Newark, N. J.	10.2	10.7	4.5	10
Annapolis, Md.	10.55	11.05	5.5	....
Baltimore, Md.	9.95	10.45	5.5	10.8
Cumberland, Md.	11.35	11.85	5.5	12.3
Washington, D. C.	10.2	10.7	4.5	11.3
Danville, Va.	11.65	12.15	6.5	12.55
Norfolk, Va.	10.45	10.95	6.5	12.3
Petersburg, Va.	10.75	11.25	6.5	13.3
Richmond, Va.	10.75	11.25	6.5	13.3
Roanoke, Va.	11.95	12.45	6.5	12.8
Charleston, W. Va.	12.25	12.75	6.5	13.6
Parkersburg, W. Va.	11.55	12.05	6.5	13.3
Wheeling, W. Va.	11.55	12.05	6.5	13.9
Charlotte, N. C.	12.1	12.6	7.5	11.6
Hickory, N. C.	12.65	13.15	7.5	12.6
Mt. Airy, N. C.	12.5	13.0	7.5	11.8
Raleigh, N. C.	11.85	12.35	7.5	12.6
Salisbury, N. C.	12.15	12.65	7.5	13.0
Charleston, S. C.	10.95	11.45	7.5	....
Columbia, S. C.	11.8	12.3	7.5	....
Spartanburg, S. C.	12.5	13.0	7.5	....

	Mineral Spirits T.W.	V.M.&P. T.W.
Newark, N. J.	13	14.5
Baltimore, Md.	15.5	....
Washington, D. C.	15.5	....

Fuel Oils—T.W.	No. 1	No. 2	No. 3
Atlantic City, N. J.	10	9	9
Newark	10	9	9
Annapolis, Md.	....	9.25	....
Baltimore	9.8	9	9
Washington, D. C.	10.3	9.4	9.4
Norfolk, Va.	10	8.8	8.8
Petersburg	10.3	9	....
Richmond	10.3	9	9
Charlotte, N. C.	10.6	10.4	....
Hickory, N. C.	....	10	....
Raleigh	11.6	10.1	....
Charleston, S. C.	....	9	....
Columbia	....	10	....
Spartanburg	....	10.8	....

*Effective Aug. 5, '42 minimum retail resale price of 14.2c posted thru New Jersey.

Discounts:

Esso gasoline—to undivided dealers, 0.5c off dealer t.w.

Kerosine—1c off t.w. price for 25 gals. or more, under contract thru territory (Baltimore city contract not necessary) except no discount in state of New Jersey.

Naphthas—To buyers taking following quantities at one time: Newark, 2c per gal. on 200 gals. or more, less than 200 gals. 0.5c higher price; Baltimore, 2c off on 25 to 100 gals. and 3c on over 100 gals.; Washington, 2c off to contract buyers.

Socony-Vacuum Oil Co., Inc.

Socony Mobilgas (*Regular Grade*)

New York City	Com. Cons. T.W.	Indiv. Dlr. T.W.	Gasoline Taxes
Manhattan & Bronx	10.1	10.6	*5.5
Kings & Queens	10.1	10.6	*5.5
Richmond	9.7	10.2	*5.5
Albany, N. Y.	9.9	10.4	5.5
Binghamton, N. Y.	11	11.5	5.5
Buffalo	10.2	10.7	5.5
Jamestown, N. Y.	10.4	10.9	5.5
Mt. Vernon, N. Y.	10.1	10.6	5.5
Plattsburg, N. Y.	11	11.5	5.5
Rochester, N. Y.	10.8	11.3	5.5
Syracuse, N. Y.	10.5	11	5.5
Bridgeport, Conn.	10	10.5	4.5
Danbury, Conn.	10.5	11	4.5
Hartford, Conn.	10.6	11.1	4.5
New Haven, Conn.	10	10.5	4.5
Bangor, Me.	10.7	11.2	5.5
Portland, Me.	10.3	10.8	5.5
Boston, Mass.	9.9	10.4	4.5
Concord, N. H.	11.4	11.9	5.5
Lancaster, N. H.	12	12.5	5.5
Manchester, N. H.	11.3	11.8	5.5
Providence, R. I.	10	10.5	4.5
Burlington, Vt.	10.9	11.4	5.5
Rutland, Vt.	11	11.5	5.5

	Mineral Spirits T.W.	V.M.&P. T.W.
Buffalo, N. Y.	12.4	13.6
New York City	11	12
Rochester, N. Y.	13.2	14.4
Syracuse, N. Y.	14	....
Boston, Mass.	12	13
Bridgeport, Conn.	†16.3	†17.3
Hartford, Conn.	†16.3	†17.3
Providence, R. I.	13	14

	Kerosine Yard	Kerosine TW	Mobilfuel Diesel TC	Mobilfuel Diesel TW	Mobilheat Fuel Yard	Mobilheat Fuel TW
New York:						
Manhat'n & Bronx	7.5	10.3	....	9.3	7.1	9
Kings & Queens	7.5	10.3	....	9.3	7.1	9
Richmond	7.5	10.3	....	....	7.1	8.8
Albany	7.5	9.8	7	9.3	7	9
Binghamton	8.9	11.2	....	10.7	8.4	10.2
Buffalo	8.6	10.9	8	10.3	8.2	10
Jamestown	8.7	11	....	10.6	8.3	10
Mt. Vernon	7.6	10.3	....	9.4	7.2	9
Plattsburg	8.1	10.4	....	9.9	7.6	9.4
Rochester	8.7	11	7.9	10.2	7.9	9.7
Syracuse	8.5	10.8	7.8	10.1	7.8	9.6
Conn.:						
Bridgeport	7.8	10.3	....	....	7.2	8.8
Danbury	8.2	10.8	....	....	7.5	8.8
Hartford	8.0	10.5	....	9.5	7.2	9
New Haven	7.8	10.3	....	9.3	7	8.9
Maine:						
Bangor	7.9	10.2	7.4	9.7	7.4	9.1
Portland	7.5	10.2	7	9.3	7	9
Mass.:						
Boston	7.8	10.6	6.9	9.2	7.1	9
N. H.:						
Concord	8.4	10.7	....	....	8.2	10
Lancaster	9.5	11.8	....	....	9.2	11
Manchester	8.5	11.1	....	....	7.9	9.7
R. I.:						
Providence	7.6	9.9	6.9	9.2	7.1	8.9
Vermont:						
Burlington	8.1	10.4	7.5	9.8	7.5	9.2
Rutland	8.3	10.6	....	10	7.7	9.5

*Does not include 1% city sales tax applicable to price of gasoline (ex tax).

†In steel barrels.

Discounts: Diesel—On t.w. deliveries, 0.5c for at least 400 gals.; 1c for full tank truck.

Atlantic Refining

Atlantic White Flash Gasoline (*Regular Grade*)

	Commercial T.W.	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
Philadelphia, Pa.	10.2	10.7	5.5	12.25
Pittsburgh	10.7	11.2	5.5	12.6
Allentown	10.7	11.2	5.5	12.6
Erie	10.7	11.2	5.5	12.6
Scranton	10.7	11.2	5.5	12.6
Altoona	10.7	11.2	5.5	12.6
Emporium	10.7	11.2	5.5	12.6
Indiana	10.7	11.2	5.5	12.6
Uniontown	10.7	11.2	5.5	12.6
Harrisburg	10.7	11.2	5.5	12.6
Williamsport	10.7	11.2	5.5	12.6
Dover, Del.	....	11.2	5.5	12.6
Wilmington, Del.	....	10.7	5.5	12.1
Boston, Mass.	....	10.9	4.5	....
Springfield, Mass.	....	11.8	4.5	....
Worcester, Mass.	....	11.5	4.5	....
Fall River, Mass.	....	11	4.5	....
Hartford, Conn.	....	11.6	4.5	....
New Haven, Conn.	....	11	4.5	....
Providence, R. I.	....	11	4.5	....
Atlantic City, N. J.	....	10.7	4.5	10
Camden, N. J.	....	10.7	4.5	10
Trenton, N. J.	....	10.7	4.5	10
Annapolis, Md.	....	11.05	5.5	10.8
Baltimore, Md.	....	10.45	5.5	9.8
Hagerstown, Md.	....	11.55	5.5	10.3
Richmond, Va.	....	11.25	6.5	12.3
Wilmington, N. C.	....	11.55	7.5	11.9
Brunswick, Ga.	....	10.4	7.5	‡11.1
Jacksonville, Fla.	....	10.4	8.5	12.1

	Mineral Spirits T.W.†	V.M.&P. T.W.†
Philadelphia, Pa.	11	12.5
Lancaster, Pa.	12	13.5
Pittsburgh, Pa.	12.5	13.5

Fuel Oils—T.W.	1	2	3	5	6
Phila., Pa.	10.1	9	9	5.76	5.33*
Allentown, Pa.	10.6	9.3	9.3	....	....
Wilmington, Del.	10.1	9	9	....	....
Springfield, Mass.	10.2	9.4	9.4	....	....
Worcester, Mass.	10.2	9.3	9.3	....	....
Hartford, Conn.	10.5	9	9	....	....

‡Does not include 1c Georgia kerosine tax.

†Mineral Spirits prices also apply to Stoddard Solvent; V.M.&P. prices also apply to Light Cleaners Naphtha.

Discounts:

Gasoline—to undivided dealers, 0.5c off dealer t.w., except Georgia & Florida dealer t.w. and undivided dealer t.w. prices are same.

Kerosine—Thru Penna. & Delaware, 2c off t.w. price on t.w. deliveries of 25 gals. or more at one time.

*Residual fuel 16.0-19.9 gravity.

S. O. Ohio††

***Sohio X-70 Gasoline (*Regular Grade*)**

	Consumer T.W.	**Reselers	‡S.S.	Gasoline Taxes	†Kerosine T.W.
Ohio, Statewide	12	10	13.5	5.5	9.3
Akron	12	9.5	12.5	5.5	9.3
Cincinnati	12	9.5	12.5	5.5	9.3
Cleveland	12	9.5	12.5	5.5	9.3
Columbus	12	9.5	12.5	5.5	9.3
Dayton	12	9.5	12.5	5.5	9.3
Marietta	12	9.5	12.5	5.5	9.3
Portsmouth	12	9.5	12.5	5.5	9.3
Toledo	12	9.5	12.5	5.5	9.3
Youngstown	12	9.5	12.5	5.5	9.3

Aviation Gasoline—Statewide	Consumer T.W.	Gasoline Taxes
Sohio aviation grade 65 octane, Spec. AN-VV-F-756	14.5	5.5
Esso Ethyl Aviation 73 Oct.	15.5	5.5
Esso Ethyl Aviation 80 Oct.	16.5	5.5
Esso Ethyl Aviation 87 Oct.(a)	17.5	5.5
Esso Ethyl Aviation 91 Oct.	17.5	5.5
Esso Ethyl Aviation 100 Oct.	24.5	5.5

(a) Effective Oct. 15, 1942.

	†Naphtha—T.W. Statewide	Lucas County
S. R. Solvent	13.5	13.5
D. C. Naphtha	14.5	14.25
V.M.&P. Naphtha	14.5	14.25
Varnolene	14.5	14.25
Sohio Solvent	14.5	14.25

Fuel Oils—T.W.	No. 1	No. 2	No. 3	No. 4
Ohio, Statewide	8.3	8.3	7.8	....
Cleveland	10.3	10.3	9.8	7.55

*Renown (third-grade) prices are same as X-70 unless otherwise noted.

**Except authorized agents.

†Kerosine prices are ex 1c state tax. Naphtha prices are ex 1.5c federal & 4c state tax.

‡Prices at company-operated stations.

††Statewide prices are subject to exceptions other than those shown.

Discounts:

Esso aviation—on contract to hangar operators and resellers, 2c off consumer t.w.

Fuel oils—Statewide prices are for t.w. & drum deliveries of 50 gals. or more; prices for deliveries of less than 50 gals. are 0.5c higher. Cleveland Nos. 1, 2, and 3 prices are for bulk deliveries of 5 to 99 gals.; 100 gals. and over are 2c less. Cleveland No. 4 price is for full compartment hose dump only.

Naphthas—to contract consumers off t.w. prices—Statewide: 300 to 999 gals., 0.5c; 1000 to 2499 gals., 0.75c; 2500 to 4999 gals., 1c; 5000 or more gals., 1.5c. Lucas County: Less than 50 gals., tank wagon price, 50 to 249 gals., 0.5c; 250 to 499 gals., 1c; 500 gals. or over, 1.5c.

S. O. Kentucky

Crown Gasoline (*Regular*)
Standard (*Third Grade*)

	†Net Crown	Dealer Standard	Gasoline Taxes	Kerosine T.W.
Covington, Ky.	9.5	8.5	6.5	9.25
Lexington, Ky.	10.5	8.5	6.5	9.25
Louisville, Ky.	10	9	6.5	8.75
Paducah, Ky.	10	8	6.5	8.75
Jackson, Miss.	10	9	7.5	*9
Vicksburg, Miss.	9.5	8.5	7.5	*8.5
Birmingham, Ala.	10	9	*8.5	9
Mobile, Ala.	9	7	*9.5	8.5
Montgomery, Ala.	10	9	*9.5	10
Atlanta, Ga.	11.4	..	7.5	*11.8
Augusta, Ga.	11.4	...	7.5	*11.3
Macon, Ga.	11.4	...	7.5	11.8
Savannah, Ga.	10.4	...	7.5	*10.8
Jacksonville, Fla.	10.4	...	8.5	9.8
Miami, Fla.	10.4	...	8.5	9.8
Pensacola, Fla.	9	8	*9.5	8
Tampa, Fla.	10.4	...	8.5	9.8

*Taxes: In tax column are included these city and county gasoline taxes: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Montgomery, Ala. have 1c kerosine tax, Mississippi 0.5c, not included in above prices.

†Consumer t.w. prices are same as net dealer prices.

S. O. Indiana

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)

	Red Crown Cons. T.W.	Dealer Prices Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Chicago, Ill.	10.9	8.9	8.4	4.5	10.6
Decatur, Ill.	10	8.5	8	4.5	9.8
Joliet, Ill.	11.9	9.6	8.5	4.5	10.6

(Continued on next page)

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 24 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c, Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

TANK WAGON PRICES

Commercial or consumer tank car, tank wagon, dealer, and service station prices for gasoline **do not include taxes;** *they do, however, include inspection fees as shown in general footnote. Gasoline taxes, shown in separate column, include 1.5c federal, and state taxes; also city and county taxes as indicated in footnotes. Kerosine tank wagon prices also do not include taxes; kerosine taxes where levied are indicated in footnotes. Dealer discounts are shown in footnotes. These prices in effect* May 3, 1943 *as posted by principal marketing companies at their headquarters offices, but subject to later correction.*

S. O. Indiana (Cont'd)

Red Crown (*Regular Grade*)
Blue Crown (*Third Grade*)

	Red Crown Cons. T.W.	Dealer Prices Red Crown	Blue Crown	Gasoline Taxes	Kerosine T.W.
Peoria, Ill.	11.7	9.2	9.1	4.5	10.4
Indianapolis, Ind.	11.6	9.7	9.6	5.5	*10.1
Evansville, Ind.	11.4	9.9	7.9	5.5	*9.9
South Bend, Ind.	12	10.5	10	5.5	*10.5
Detroit, Mich.	11.4	9.9	9.4	4.5	10
Grand Rapids, Mich.	10.8	9.3	8.8	4.5	9.9
Saginaw, Mich.	11.4	9.9	9.4	4.5	9.9
Green Bay, Wis.	12.2	10.7	10.2	5.5	10.9
Milwaukee, Wis.	12.1	10.6	10.1	5.5	10.8
La Crosse, Wis.	11.9	10.4	9.9	5.5	10.6
Minneapolis-St. Paul	11.9	10.4	9.5	5.5	10.6
Duluth, Minn.	12.2	10.7	10.2	5.5	10.9
Mankato, Minn.	11.9	10.4	9.5	5.5	10.6
Des Moines, Ia.	11.4	9.9	9.4	4.5	*10.1
Mason City, Ia.	11.7	10.2	9.7	4.5	*10.4
St. Louis, Mo.	10.3	8.8	8.6	*4.5	10.1
Kansas City, Mo.	10.4	8.9	7.9	*4.5	9.7
St. Joseph, Mo.	11.2	9.7	8.7	*4.5	9.7
Fargo, N. D.	12.9	11.4	10.5	5.5	11.6
Huron, S. D.	12.3	10.8	10.3	5.5	11
Wichita, Kans.	9.7	8.2	6.5	4.5	8.3

Stanavo Aviation 73 Octane

Chicago, Ill.	15.7		4.5
Milwaukee, Wis.	15.9		5.5
Minneapolis, Minn.	15.7		5.5
St. Louis, Mo.	15.2		*4.5
Kansas City, Mo.	14.8		*4.5
Fargo, N. D.	16.7		5.5
Huron, S. D.	16.1		5.5

	Oleum Spirits	V.M.&P. Naphtha	Stanisol	*Taxes
(Prices are base prices before discounts)				
Chicago	13.5	13.8	12.8	4.5
Detroit	15.8	15	16.3	4.5
K. C., Mo.	13.3	14.3	13.8	1.5
St. Louis, Mo.	13.7	14.7	13.2	1.5
Milwaukee	14.4	15.4	14.9	5.5
Minneap'lis	14.2	15.2	13.5	5.5

Fuel Oils T.W.

Chicago	Standard Heater Oil
1-99 gals.	9.3
100-149 gals.	8.3
150 gals. & over	7.8

	Stanolex Fuel Oil No. 1	Stanolex Furnace Oil
1-99 gals.	8.8	8.8
100-149 gals.	7.8	7.8
150-399 gals.	7.8	7.8
400 gals. & over	7.3	7.3

	Stanolex Fuel Oil A	Stanolex Fuel Oil B
1-99 gals.	8.3	8.3
100-399 gals.	7.3	7.3
400-749 gals.	6.3	6.3
750 gals. & over	5.55	5.55

	Stanolex Bunker C Fuel Oil
1-399 gals.	6.8
400-999 gals.	5.8
1000 gals. & over	4.8

Other Points Indianapolis	Stanolex No. 1	Stanolex Furnace Oil
1-99 gals.	...	*9.0
100 gals. & over	...	*8.0
Detroit		
1-99 gals.	...	8.1
100 gals. & over	...	7.1
Milwaukee		
1-99 gals.	...	9.0
100 gals. & over	...	8.0
Minneapolis		
1-99 gals.	...	8.8
100 gals. & over	...	7.8
St. Louis		
1-99 gals.	8.6	8.1
100 gals. & over	7.6	7.1
Kansas City		
1-99 gals.	...	7.9
100 gals. & over	...	6.9

*Taxes: In gasoline tax column are included these city taxes—Kansas City, St. Joseph, and St. Louis, 1c. Indiana kerosine and fuel oil prices are ex 4c state tax; Iowa kerosine prices are ex 3c state tax. In naphtha tax column are included 1.5c federal tax and state taxes.

State sales, occupation, consumer and use taxes to be added when applicable.

S. O. Nebraska

(*Regular Grade*)

	T.W. Dealer	Gasoline Taxes	Kerosine T.W.
Omaha	11.4 8.9	6.5	10.1
McCook	10.5 9.4	6.5	9.3
Norfolk	11.9 10.4	6.5	10.6
North Platte	11 9.9	6.5	10.3
Scottsbluff	12.4 9.5	6.5	9.8

S. O. Louisiana

Esso Gasoline (*Regular Grade*)

	Consumer Tank Wagon	Dealer T.W.	Gasoline Taxes	Kerosine T.W.
New Orleans, La.	8.75	9.25	8.5	*9
Baton Rouge, La.	8.75	9.25	8.5	*9.5
Alexandria, La.	8.75	9.25	8.5	*9.5
Lafayette, La.	9	9.5	8.5	*9
Lake Charles, La.	9	9.5	8.5	*11
Shreveport, La.	8.5	9	8.5	*8
Knoxville, Tenn.	9.5	10	8.5	12.5
Memphis, Tenn.	8.90	9.40	8.5	10.5
Chattanooga, Tenn.	10.5	11	8.5	11
Nashville, Tenn.	10.5	11	8.5	10
Bristol, Tenn.	10.95	11.45	8.5	13.1
Little Rock, Ark.	9.5	10	8	10

*Louisiana kerosine prices are ex 1c state tax. Discounts:

Esso Gasoline—To undivided dealers, 0.5c off dealer t.w.

Humble Oil & Refining Co.

Humble Motor Fuel (*Regular Grade*)
Thriftane (*Third Grade*)

	Humble *Tank Wagon	Humble Retail	Thriftane *Tank Wagon	Thriftane Retail	Gasoline Taxes
Dallas, Tex.	7.5	10.5	6.5	8.5	5.5
Ft. Worth, Tex.	6.5	10.5	6	9	5.5
Houston, Tex.	8.5	12.5	7.5	10.5	5.5
San Antonio, Tex.	8.5	12.5	7.5	10.5	5.5

	Kerosine *Tank Wagon	Kerosine Retail
Dallas, Tex.	7	11
Ft. Worth, Tex.	7	11
Houston, Tex.	8	11
San Antonio, Tex.		10
73 Oct. Aviation Gasoline		**Tank Car**
FOB Baytown, Tex.		8.5

*To all classes of dealers & consumers.

The Texas Co.

	Gasoline—Dealer T.W. Fire-Chief (*Regular*)	Indian (*3rd Grade*)	Gasoline Taxes
Dallas, Tex.	7.5	6.5	5.5
Ft. Worth, Tex.	6.5	6.0	5.5
Wichita Falls, Tex.	8.5	7.5	5.5
Amarillo, Tex.	8.5	7.5	5.5
Tyler, Tex.	8.5*	7.5*	5.5
El Paso, Tex.	9.5	8.5	5.5
San Angelo, Tex.	8.5	7.5	5.5
Waco, Tex.	8*	7*	5.5
Austin, Tex.	8.5	7.5	5.5
Houston, Tex.	8.5	7.5	5.5
San Antonio, Tex.	8.5	7.5	5.5
Port Arthur, Tex.	8.5	7.5	5.5

*Less 1c temporary allowance to all dealers.

Continental Oil Co.

(N.B. Prices are Continental's "structural" prices. Prices do not reflect temporary reductions made to meet local competition).

	Conoco Bronz-z-z (*Regular*) †Tank Wagon	Demand (*3rd Grade*)	Gasoline Taxes	Kerosine T.W.
Denver, Col.	11	10	5.5	11
Grand Junction, Col.	12	11	5.5	12
Pueblo, Col.	10.5	9.5	5.5	10.5
Casper, Wyo.	11.5	10.5	5.5	12
Cheyenne, Wyo.	11	10	5.5	11.5
Billings, Mont.	12.5	11.5	6.5	12.5
Butte, Mont.	13.5	12.5	6.5	13.5
Great Falls, Mont.	12.5	11.5	6.5	12.5
Helena, Mont.	13	12	6.5	13
Salt Lake City, Utah	13.5	12.5	5.5	14.5
Boise, Ida.	14.1	13.1	6.5	16.5
Twin Falls, Ida.	15.6	14.6	6.5	17
Albuquerque, N. M.	10	9	*7	9.5
Roswell, N. M.	9.5	8.5	*7	9
Santa Fe, N. M.	10.5	9.5	*7.5	10
Ft. Smith, Ark.	9.5	9.25	*7	9.5
Texarkana, Ark.	9	8	*5.5	9
Muskogee, Okla.	9.5	8.5	7	8.5
Oklahoma City, Okla.	9.5	8.5	7	8.5
Tulsa, Okla.	9.5	8.5	7	8.5

*Taxes: In gasoline tax column are included these city taxes—Albuquerque, & Roswell, 0.5c; Santa Fe, 1c. Texas 4c state tax applies within city limits of Texarkana, Ark.; Okla. 5.5c state applies within city limits of Ft. Smith, Ark.

†To consumers & dealers

S. O. California

Standard Gasoline (*Regular Grade*)
Flight Gasoline (*Third Grade*)

	Standard Posted Net Tank Truck	Standard Posted Retail	Flight Posted Net Tank Truck	Flight Posted Retail	Gasoline Taxes
San Francisco, Cal.	10	14	9	12	4.5
Los Angeles, Cal.	9.5	13.5	8.5	11.5	4.5
Fresno, Cal.	11	15	10	13	4.5
Phoenix, Ariz.	12	16	10	13	6.5
Reno, Nev.	12	16	11	14	5.5
Portland, Ore.	10.5	14.5	9.5	12.5	6.5
Seattle, Wash.	10.5	14.5	9.5	12.5	6.5
Spokane, Wash.	12.5	16.5	11.5	14.5	6.5
Tacoma, Wash.	10.5	14.5	9.5	12.5	6.5

Std. Aviation 73

	Posted Net Tank Truck	Gasoline Taxes	Kerosine Tank Truck
San Francisco, Cal.	12.5	4.5	11.5
Los Angeles, Cal.	12	4.5	10
Fresno, Cal.	13.5	4.5	12.5
Phoenix, Ariz.	14.5	6.5	12.5
Reno, Nev.	14.5	5.5	13.5
Portland, Ore.	13	6.5	13.8
Seattle, Wash.	13	6.5	13.8
Spokane, Wash.	16	6.5	16.8
Tacoma, Wash.	13	6.5	13.8

Resale & Commercial: T.C. deliveries 0.25c per gal. off posted net tank truck.

Commercial: Retail deliveries, and/or tank truck deliveries of less than 40 gals., 4c per gal. above posted net tank truck price for Standard Aviation and Standard Gasoline, and 3c per gal. above posted net tank truck for Flight Gasoline, except single deliveries of less than 40 gals. to Marine trade only, which are billed at posted net tank truck price.

Canada

PRICES ON IMPERIAL OIL, LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-Star Imperial Gasoline (*Regular Grade*)

	†Gasoline T.W.	*Gasoline Taxes	†Kerosine T.W.
Hamilton, Ont.	17.5	11	18
Toronto, Ont.	17.5	11	18
Brandon, Man.	21	10	23
Winnipeg, Man.	20.5	10	22.5
Regina, Sask.	18	10	20
Saskatoon, Sask.	20.8	10	22.8
Edmonton, Alta.	18.9	10	20.9
Calgary, Alta.	16	10	18
Vancouver, B. C.	15	10	24
Montreal, Que.	17	11	17.5
St. John, N. B.	16.5	13	19
Halifax, N. S.	16.5	13	19

*Includes 3c Federal, and Provincial taxes.
†To divided & undivided dealers.

Above prices include these inspection fees on both gasoline and kerosine unless otherwise specified per gallon:
Alabama 1/40c on gasoline, 1/2c on kerosine; Arkansas 1/20c; Florida 1/8c; Illinois 3/100c; Indiana 1/5c in lots of 25 bbls. or less, 2/25c in lots of more than 25 bbls.; Kansas 1/50c; Louisiana 1/32c; Minnesota 7/200c; Missouri 1/50c; Nebraska 3/100c; Nevada, gasoline 1/20c; North Carolina 1/4c; North Dakota 1/20c; Oklahoma 2/25c; South Carolina 1/8c; South Dakota 1/20c; Tennessee 2/5c; and Wisconsin 3/100c.
Kerosine inspection fees only: Iowa 3/50c; Michigan 1/5c per gal.

Dormant Equipment can Work or Fight--
IF YOU CAN'T FIND A USE FOR IT, *Scrap it!*
WAR-OIL EQUIPMENT EXCHANGE

For Sale

FOR SALE 20 clean 8,000 gallon tank cars and ten 8,000 gallon fuel oil cars with coils. Address Box 230, National Petroleum News.

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FOR SALE

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National Petroleum News

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About OIL PEOPLE

Thanks . . .
From the Oil Industry

For a Job Well Done in Wartime Government Service

TO:

Robert H. Collacott, chief of the refined products unit in OPA's oil price division at Washington, who resigned April 30. He has returned to Akron, Ohio, to resume his duties as division manager for Ohio Standard, with which he has been connected for nearly a quarter of a century. Mr. Collacott came to OPA in November, 1941, on leave of absence from Sohio.

* * *

W. D. Mason, director of PAW's facilities security division at Washington, who resigned April 30 to return to Sun Oil Co. Mr. Mason, who served with PAW a year and a week, was on leave of absence from his position as general manager of Sun's Marcus Hook refinery.

° ° °

Buttons have been popping off the vest of **Frank Pasco**, Chicago, sales manager for Seneca Petroleum Co. His first grandchild, Frederick T. Comee III, arrived April 17. Friends declare the cigars are excellent and expensive.

° ° °

Adrian Moore

Adrian Moore, Houston independent drilling contractor and oil operator, is now director of production in PAW's District 3 office. His appointment was announced last week by PAW Deputy Davies. He succeeds **E. O. Buck**, who resigned to become superintendent of operations for Rowan Brothers Drilling Co., Fort Worth.

Mr. Moore has had 26 years experience in the oil industry, starting as production superintendent for Rycade Oil Corp., after graduating from the University of Texas. He later joined Amerada Petroleum Corp. as division manager. In 1941 he was drafted by PAW as assistant director of production. For 11 years prior to that he had been a consulting petroleum engineer at Houston, and a petroleum engineer with Conroe Field Operations Assn. and with the Texas Railroad Commission. He is a member of the Independent Producers Assn. and American Petroleum Institute.

C. R. Younts (left), president of Plantation Pipe Line Co., presents to Gov. Colgate W. Darden, Jr., of Virginia, the first gasoline delivered through the New Greensboro-Richmond extension of the Plantation line. The extension opened April 23 with appropriate ceremonies. No gasoline rationing coupons were in evidence, but apparently Gov. Darden will keep the gasoline forever in the bottle

° ° °

John D. King, Chicago, attorney on the District 2 industry committee staff, discovered a soft ball is not always so soft. In early spring sandlot practice, he caught one on his thumb last week and broke it.

° ° °

Otto Donnell, Findlay, Ohio Oil Co., who succeeded Frank Phillips, Bartlesville, Phillips Petroleum Co., as chairman of the general committee, District 2, has just returned from California where he has been since early in April.

° ° °

Paul Taliafero, Tulsa, vice-president and counsel of Sunray Oil Corp., until the armed services claimed him several months ago, has been promoted to captain and placed in charge of the Los Angeles district of the Air Force Technical Training Command for the advocate general.

° ° °

John C. Walker, Bartlesville, Okla., general superintendent of Cities Service Oil Co.'s chemical division, is now industrial research and development consultant for the Referee Board of the Chemicals Industry Branch of the Office of Production Research and Development, War Production Board.

° ° °

John B. Schuyler, PAW District 4 director of materials at Denver, Colo., returning home from Washington, stopped over in Chicago for a brief visit with friend **Loyal B. Holland**, PAW District 2 director of materials.

° ° °

Oklahoma's newly-created postwar planning commission will have an oil man at the head—President **K. S. Adams** of Phillips Petroleum Co., Bartlesville. He has accepted appointment as chairman of the planning commission and vice-chairman of the state planning and resources board, under which it will operate. Gov. Robert Kerr of Oklahoma announced last week.

* * *

E. V. Weber, Cincinnati, Eureka Oil Co., chairman of the general committee, American Petroleum Institute's division of marketing, has appointed the lubrication committee for 1943 with **L. C. Welch**, Chicago, Indiana Standard, as chairman, and **L. P. Lochridge**, New York, Sinclair, as vice-chairman. Other members of the A.P.I. lubrication committee for 1943 are:

K. C. Baker, St. Louis, J. D. Streett & Co.; **M. R. Bower**, Cleveland, Ohio Standard; **M. B. Chittick**, Chicago, Pure; **Dayton P. Clark**, Pittsburgh, Gulf; **Oscar Cordell**, Tulsa, Bareco; **W. H. Correa**, New York, Socony-Vacuum; **R. Cubicciotti**, Los Angeles, Union Oil of California; **J. C. Day**, Tulsa, Western Petroleum Refiners Assn.; **J. M. Evans**, San Francisco, Tide Water Associated; **G. French**, Los Angeles, Richfield; **M. S. Hauser**, Findlay, Ohio Oil Co.; **H. P. Hobart**, Pittsburgh, Gulf; **W. L. Holmgren**, **Minneapolis**, W. H. Barber Co.; **P. V. Kane**, Philadelphia, Sun; **F. C. Kerns**, New York, Texaco; **J. M. Koch**, Oil City, Quaker State; **H. W. Kuegler**, Cleveland, National Refining; **G. P. MacDonald**, New York, Richfield; **M. C. Mallon**, Washington, National Petroleum Assn.; **R. W. McDowell**, Tulsa, Mid-Continent Petroleum; **E. V. Moncrieff**, New York, Swan-Finch Oil Corp.; **W. M. Murray**, Chicago, Deep Rock; **C. R. Olsen**, El Dorado, Ark., Lion Oil Refining; **W. C. Platt**, Cleveland, NATIONAL PETROLEUM NEWS; **E. G. Richardson**, New Orleans, International Lubricants Corp.; **Raymond Shaw**, Chicago, Chek-Chart; **R. G. Sonneborn**, New York, L. Sonneborn Sons; **D. B. Spanogle**, Philadelphia, Atlantic Refining; **B. G. Symon**, New York, Shell; **T. A. Telfer**, Chicago, Calumet Refining; **O. J. Tuttle**, Chicago, Cities Service; **H. G. Vesper**, San Francisco, California Standard; **A. L. Wiest**, San Francisco, Shell.

° ° °

J. R. Rickley and **J. C. Hinkle**, both residents of Peoria, have received promotions from the National Refining Co., which each has served for the past 21 years. Mr. Rickley, who has been sales manager of the central division has been advanced to the post of divisional manager. Mr. Hinkle, sales promotion manager, has been named sales manager of the central division.

An oil man, **Lt. Comdr. William H. Henszey,** is in charge of the newly-completed $1,000,000 U. S. naval section base at Panama City, Fla. Commander Henszey founder and president of Refiners Marketing Co., Ltd., Los Angeles, resigned last Oct. 31 and has since been on active duty with the Navy. The base is a part of the Local Defense Forces directly under the Eighth Naval District of New Orleans.

° ° °

An oil man, joining the Army, leaves his business in a competitor's hands . . . the competitor's second highest officer is already in the Navy . . . the Navy man's wife helps run both businesses—thus releasing two men for Uncle Sam, saving manpower, tires and gasoline, putting womanpower to work!

Paull B. Boger, owner-manager of Shell of Sampson, Shell distributor of Sampson, N. C., joined the Army April 15 and left his customers to be cared for by competitor Sampson-Bladen Oil Co., Pure Oil distributor.

In a newspaper advertisement, Mr. Boger announced:

"We have made arrangements with the Sampson-Bladen Oil Co. to deliver our products for the duration of the war. All business transactions in connection with our firm will be handled by Sampson-Bladen Oil Co. . . . with the view of conserving manpower, tires and gasoline for the war effort.

"I wish to thank all our customers and friends for their past patronage and solicit your continued cooperation under conditions brought about by the war."

Sampson-Bladen's vice-president and former manager of the Clinton, N. C., branch, **Hardin Kimrey,** is already in the Navy. His wife, Mrs. Kimrey, and **Milton L. Fisher,** secretary-treasurer and manager at Elizabethtown, N. C., carry on the two competitive businesses.

° ° °

Dr. A. W. Schoenleber, for 22 years medical director of New Jersey Standard and its affiliates, has retired because of illness.

Following service as second lieutenant in the U. S. Army Medical Corps in World War I, he resigned in 1919 as colonel in the medical reserve to join Carter Oil Co., Tulsa. In 1921 he was transferred to Jersey Standard at New York to assist **Dr. W. J. Denno,** general medical director.

Dr. Schoenleber helped organize and develop the medical services of affiliated companies in Europe, South America, and the East Indies, spending much time in foreign countries. He is author of many articles on tropical medicines and hygiene.

° ° °

D. A. Little, Dallas, president of the Magnolia Petroleum Co., and **F. M. Frasher,** San Antonio, president of the Duval Oil Corp., will be honor guests at the sixth annual oil men's meeting and banquet under the sponsorship of the South Texas Chamber of Commerce, to be held June 2 at San Antonio.

As has been the custom since 1938 when the oil men's gathering was initiated, the 1943 event will pay special honor to designated leaders in the oil industry, namely, Mr. Little and Mr. Frasher. **G. W. Killam,** veteran oil developer of Laredo, was the honor guest at the group's initial meeting in 1938. The honored oil man in 1940 was **Al Buchanan,** San Antonio; in 1941, **H. R. Cullen,** Houston, president of Quintana Petroleum Corp. The practice of honoring a pair of leaders instead of an individual was inaugurated last year when tribute was paid to **H. C. Wiess,** Houston, president of Humble Oil & Refining Co., and **W. M. Griffith,** Sinton, vice-president and general manager of the Plymouth Oil Co.

° ° °

Martin A. Bauer Edward Williams

Martin A. ("Motz") Bauer, vice-president of Continental Oil Co., Sinclair jobber at Louisville, Ky., was elected president of the Louisville Oil Men's Bowling League at its annual meeting April 13. Other officers elected were: **Ed ("Buzz") Williams,** tank truck salesman for Aetna Oil Co., vice-president; and **B. P. ("Bev") Honchell,** chief clerk, Louisville Refining Co., secretary. Mr. Honchell was president last year and as secretary succeeds **Herbert L. Clay,** who has acted as secretary of the league while also being secretary-treasurer of the Kentucky Petroleum Marketers Assn.

Mr. Bauer, Mr. Clay reports, used to be high-average league bowler 15 years ago and resumed bowling when the Louisville Oil Men's Bowling League was organized in September, 1937.

At the league's championship game played April 13, winner was Louisville Refining Co.'s "All-Time Ethyl" team, which was champion 2 years ago, also. The Aetna Oil team was runner-up and the Continental Oil team was third.

B. P. Honchell

On the Lazybench

Be A Homebody!

Should you be blessed with a holiday
And a chance to spend some leisure,
We warn you now, and heed us well:
DON'T travel for pleasure!
(It's no pleasure!)

If the family car is still on wheels
And your ration hasn't been cut,
You find at the moment you run out of gas,
All nearby gas stations are shut.

You can take a train—if they let you on.
(They may—if you have a friend.)
Train riding's excellent exercise—
You stand from beginning to end.

Or you battle through hordes for a seat
on a bus
When you hear the ticketman cry:
"No more tickets for Mudville today.
Come back on the Fourth of July!"

Or you treat yourself right and travel
by plane—
About time the family flew!
Then a higher priority rating comes up—
And they drop *you* off in Yazoo.

Nope—Mr. Eastman's correct, my friends.
Consider his idea a treasure.
When the weekend rolls round, let it find you
at home.
DON'T travel for pleasure!
(It's no pleasure!)

—*Marglio*

° ° °

NPN was quick to learn the folly of asking oil men to send in their favorite jokes for this column. We do want to continue using the mails. Thanks, nonetheless, to all contributors.

° ° °

A colored sergeant's definition of morale: "Morale is what makes your laigs do what your haid knows ain't possible."

—*Ohio Petroleum Marketer*

° ° °

What? Everything?

An oil man, well known in both domestic and foreign oil circles (sorry we can't give you his name) waited anxiously for 7 months for the delivery of certain equipment. He had filed application with PAW and had written follow-up after follow-up. Finally, he wrote again to PAW and in his letter was the following desperate paragraph:

"However, there is another angle which provides food for speculation. For example, medical science has established that a sound female with sufficient inclination and the patience to wait, can produce an offspring in nine months. But everything that could happen to a woman has happened to us and after seven months we can't even anticipate the delivery. In conclusion, therefore, we would ask you as a matter of interest to inquire from the best authority on obstetrics what it is that an expectant mother has that we haven' got, because so far as our examination indicates, we have both been through the primary stages."

° ° °

Tip to Strikers

It will never get well if you picket.

Are you showing your men how to fight fire?

● Against fire, "know-how" is a mighty weapon. Men who know how each extinguisher should be used, who know when it should *not* be used, men who know that a fire in electrical wiring must not be handled with the same fire-fighter you would use for a rubbish blaze . . . these men can save your plant in a quick-striking emergency.

It's up to you to train these men. You will train them best by letting them see extinguishers in action against real fires. *You will stage demonstrations at your plant.*

Walter Kidde & Company will send you a booklet which tells how to make demonstrations dramatic and instructive . . . how to teach men to know their fire-fighters. Write to

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536 Main Street **Belleville, N. J.**

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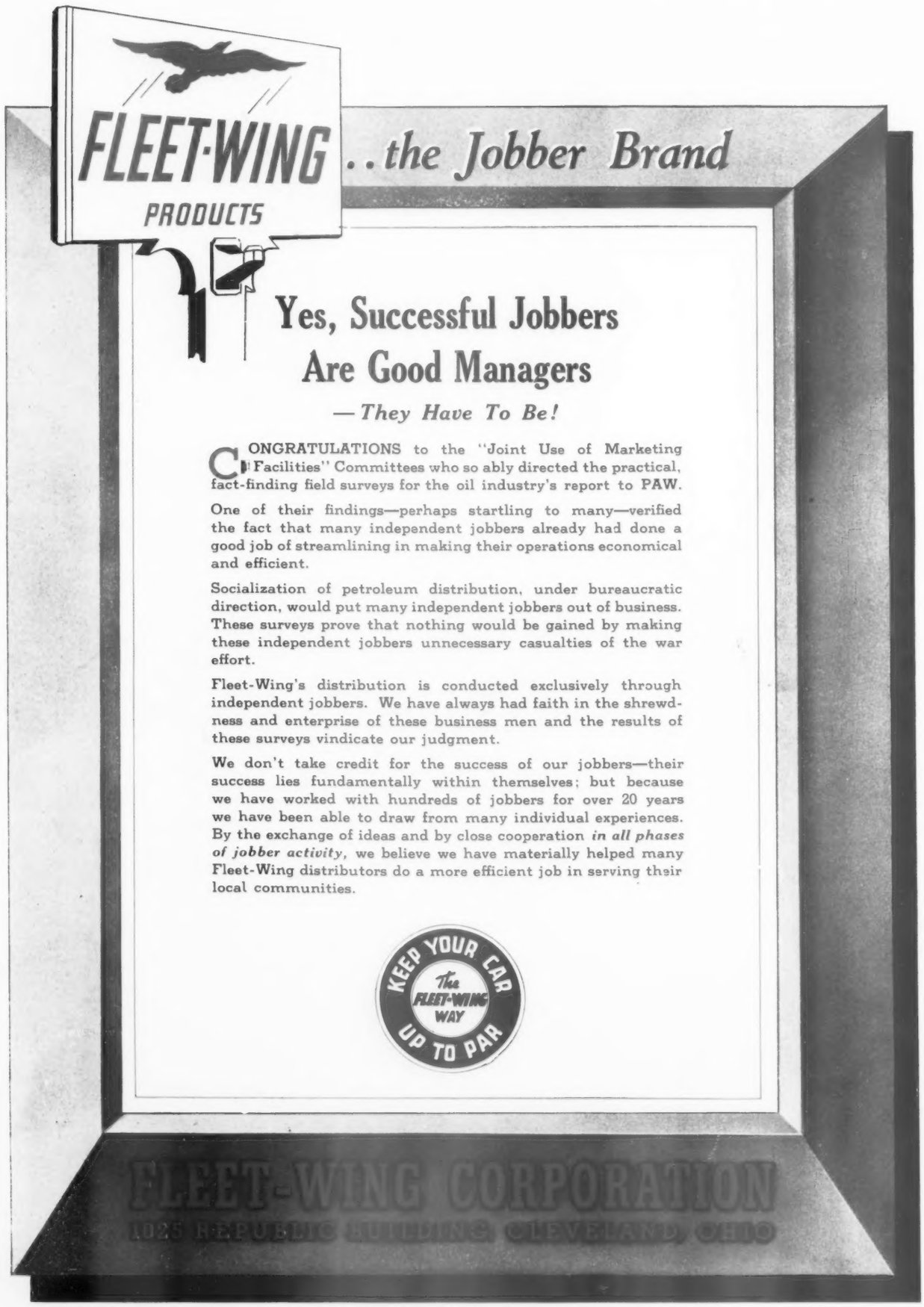
PROTECTS LIVES


FLEET-WING
PRODUCTS
..the Jobber Brand
Yes, Successful Jobbers Are Good Managers
— They Have To Be!
CONGRATULATIONS to the "Joint Use of Marketing Facilities" Committees who so ably directed the practical, fact-finding field surveys for the oil industry's report to PAW.
One of their findings—perhaps startling to many—verified the fact that many independent jobbers already had done a good job of streamlining in making their operations economical and efficient.
Socialization of petroleum distribution, under bureaucratic direction, would put many independent jobbers out of business. These surveys prove that nothing would be gained by making these independent jobbers unnecessary casualties of the war effort.
Fleet-Wing's distribution is conducted exclusively through independent jobbers. We have always had faith in the shrewdness and enterprise of these business men and the results of these surveys vindicate our judgment.
We don't take credit for the success of our jobbers—their success lies fundamentally within themselves; but because we have worked with hundreds of jobbers for over 20 years we have been able to draw from many individual experiences. By the exchange of ideas and by close cooperation in all phases of jobber activity, we believe we have materially helped many Fleet-Wing distributors do a more efficient job in serving their local communities.
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The FLEET-WING WAY
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TECHNOLOGY DEPT.

NATIONAL PETROLEUM NEWS

Monthly Technical Section Devoted to

REFINERY MANAGEMENT and PETROLEUM CHEMICAL TECHNOLOGY

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DETROIT

Volume 35 | May 5, 1943 | Number 18

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New Houdry Process Developments Improve Aviation Gasoline

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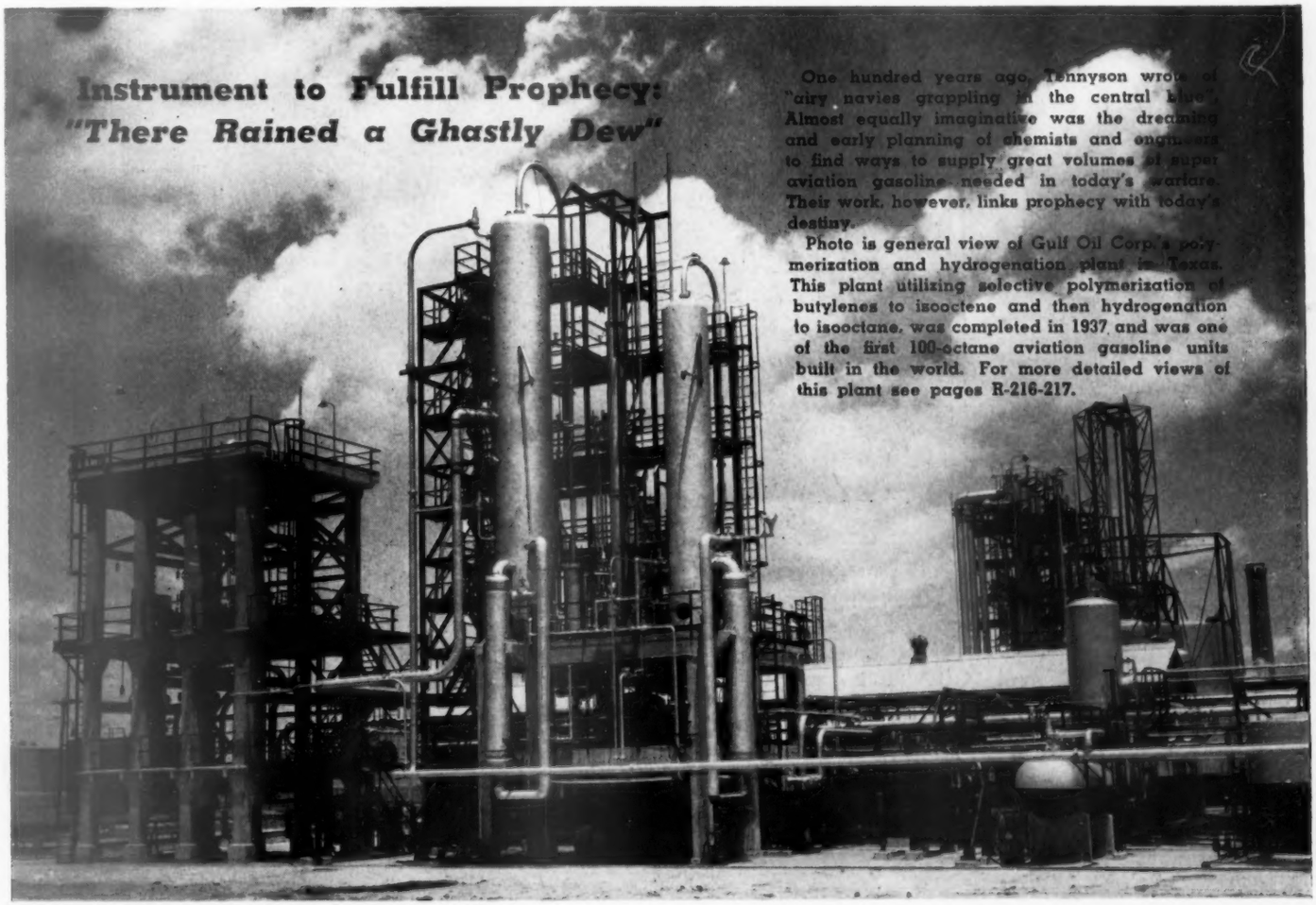
Instrument to Fulfill Prophecy:
"There Rained a Ghastly Dew"
One hundred years ago, Tennyson wrote of "airy navies grappling in the central blue." Almost equally imaginative was the dreaming and early planning of chemists and engineers to find ways to supply great volumes of super aviation gasoline needed in today's warfare. Their work, however, links prophecy with today's destiny.
Photo is general view of Gulf Oil Corp.'s polymerization and hydrogenation plant in Texas. This plant utilizing selective polymerization of butylenes to isooctene and then hydrogenation to isooctane, was completed in 1937 and was one of the first 100-octane aviation gasoline units built in the world. For more detailed views of this plant see pages R-216-217.

Technologist to Guide Planning Of Natural Gasoline Manufacturers

● The importance of technological developments in shaping the war and post-war course of natural gasoline companies is recognized in the selection of the new president of the Natural Gasoline Assn. of America, elected at its annual meeting in Dallas, April 14-16. He is James W. Vaiden, Tulsa, vice-president of Skelly Oil Co., a chemical engineer by profession.

His work in the Mid-Continent, starting as a laborer in 1924, has given him experience in many field and plant jobs, most of the time with Skelly Oil Co. He became manager of its natural gas and natural gasoline operations in 1934 and was made vice-president in charge of all manufacturing in 1941.

REFINERY MANAGEMENT *and*
PETROLEUM CHEMICAL TECHNOLOGY

May 5, 1943
Volume 35
Number 18

A MONTHLY TECHNICAL SECTION OF NATIONAL PETROLEUM NEWS *incorporating International Petroleum Technology*

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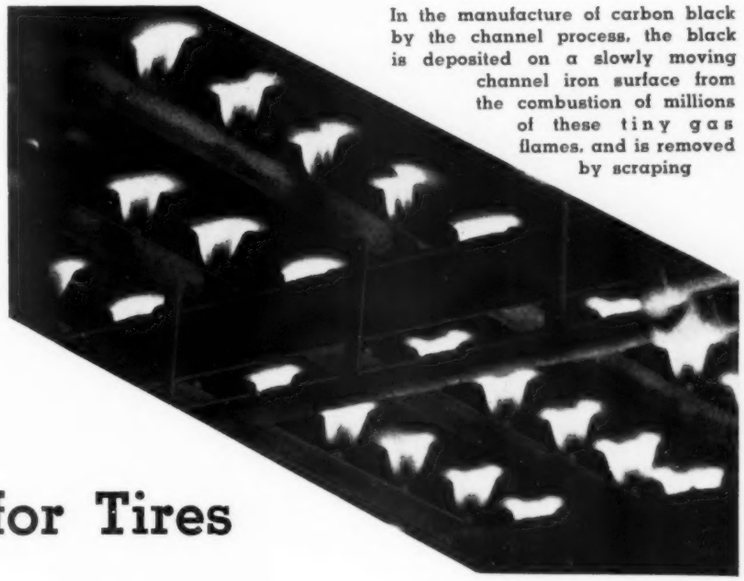


In the manufacture of carbon black by the channel process, the black is deposited on a slowly moving channel iron surface from the combustion of millions of these tiny gas flames, and is removed by scraping

New Carbon Blacks To Extend Volume Of Synthetic Rubber for Tires

THE production of carbon blacks, essential in compounding synthetic or natural rubber, is one of several horses which together are drawing the United Nations' victory chariot, hitched as it necessarily must be to a petroleum economy. Without one type, channel blacks, rubber tires would be well-nigh unusable as we know them today; without another type, furnace blacks, greater production of synthetic rubber would be required, perhaps 10% more than now is scheduled.

Carbon black manufacturing is a relatively small but old industry. Its total output in 1942, largest to date, was 600,000,000 lbs. estimated, of which Texas plants supplied 435,000,000 lbs. (see Table 1). It has been looked upon by some as a waster of a natural resource, gas. However, when the public became rubber conscious the importance of the carbon black industry in supplying an essential material for compounding with natural rubber for tires and many other uses was recognized. The development of the synthetic rubber program must be accompanied by increased production of new types of carbon black essential in compounding procedures. This is of importance to the petroleum refiner and natural gasoline manufacturer, authorities say, because in the future increasing amounts of carbon black may be manufactured from such products as distillates, kerosine and fuel oil, as well as residue gas.

"It is very encouraging to note that there is available a practical method of manufacturing the desirable furnace type of carbon black using liquid hydrocarbons as raw material," states a report† by Paul M. Raigorodsky, assistant director, and Frank H. Dotterweich, technical consultant, Natural Gas and Natural Gasoline Division, Petroleum Administration for War.

"This points to higher efficiencies in carbon black production in that the amount of carbon recovered per pound of raw material is higher with liquid raw materials. This development should allow for the expansion of the carbon black industry to supply the needs of the synthetic rubber program without placing additional strain upon existing natural gas systems and reserves. This condition will allow for the conservation of natural gas so essential in modern industry and in modern condensate production procedures. It is of importance to a refiner because a new field is opened for the use of one or more of his products."

†NPN Technical Supplement, Nov. 25, 1942, pg. 420-26.

Table 1—Carbon Black Production in Texas and the U. S.*

(Figures in pounds)

Year	Texas	U. S.	% in Texas
1927	56,396,000	198,429,000	28.4
1928	100,828,000	248,790,000	40.5
1929	228,183,000	366,442,000	62.3
1930	271,749,000	379,942,000	71.5
1931	210,878,000	280,907,000	75.1
1932	200,440,000	242,700,000	82.6
1933	218,655,000	273,125,000	80.0
1934	262,200,000	328,828,000	79.7
1935	287,874,000	352,749,000	81.6
1936	333,906,000	411,345,000	81.2
1937	421,068,000	510,606,000	82.5
1938	417,104,000	477,039,000	87.4
1939	453,174,000	525,166,000	86.3
1940	479,895,000	568,792,000	84.4
1941	480,212,000	594,065,000	80.8
1942°°	435,000,000	600,000,000	72.5

* Source, U. S. Bureau of Mines data as reported in "Important Facts about Texas Oil" (5th edition, pg. 26) published by Texas Mid-Continent Oil & Gas Assn.

°° Estimated, Bureau of Mines Basis.

In general there are 3 types of carbon black, channel, furnace and thermally cracked. Channel black is produced by the impingement of a flame, not necessarily "sooty", on a collecting surface, usually a structural steel channel, hence the name. Every housewife has found this type of black on the bottom of her pots and pans. Furnace black is produced by controlled combustion of gaseous or liquid fuels in an inadequate supply of oxygen, followed by collection of black from the flue gases through a combination of electrical precipitation and mechanical recovery. Thermally-cracked black is formed when carbonaceous vapors or gases are decomposed by heat in a regenerative-type furnace, with or without a diluent gas.

The channel and furnace processes contribute the greatest quantity of black to synthetic rubber blending. The third method, thermal cracking, while producing an excellent carbon black, at present is less important from a volume standpoint, but still is contributing its entire capacity to the carbon black stockpile.

In pre-war rubber history, channel blacks were satisfactory for blending with natural

rubber in tire and mechanical rubber goods manufacture. But there are inherent differences in characteristics of natural and synthetic rubbers which must be specially considered in compounding carbon blacks with them.

Internal Heat a 'Bottleneck'

One of the most serious differences is the degree of elasticity, or tendency to return to original dimensions upon removal of stress. Synthetic rubber does not "bounce back" like natural rubber. This tends to generate internal heat. Accordingly, a grade of channel black most suitable for natural rubber tires or mechanical rubber goods, for example, might cause ruinous elevations in internal heat in a Buna-S rubber for the same purpose. The smallest channel black particle gives maximum heat generation and maximum abrasion resistance, and conversely, while the necessity is for a particle size which will give maximum abrasion resistance and minimum heat generation. Unfortunately, these 2 desiderata cannot be obtained in a single grade of carbon black without compromise, authorities report.

Since channel blacks are highly reinforcing when blending with rubber, and furnace blacks impart a lesser abrasion resistance with less tendency towards generation of internal heat while still giving good vulcanization characteristics, furnace blacks will be used in synthetic rubber manufacture where abrasion resistance is not a prime requirement. The revolutionary aspect here is is that furnace black can also be used as a rubber "extender" (not an adulterant), up to 40 parts of black per 100 parts of Buna-S being permissible to secure the same reinforcing effect secured by smaller quantities of the "softest" channel black. In effect this provides a means for increasing the supply of Buna-S rubber if adequate supplies of furnace black are available and thereby lessens the burden on butadiene and rubber polymerizing plants.

Manufactured carbon black is stored in "silos", some of which are 150 feet high, ready for loading by conveyors into freight cars

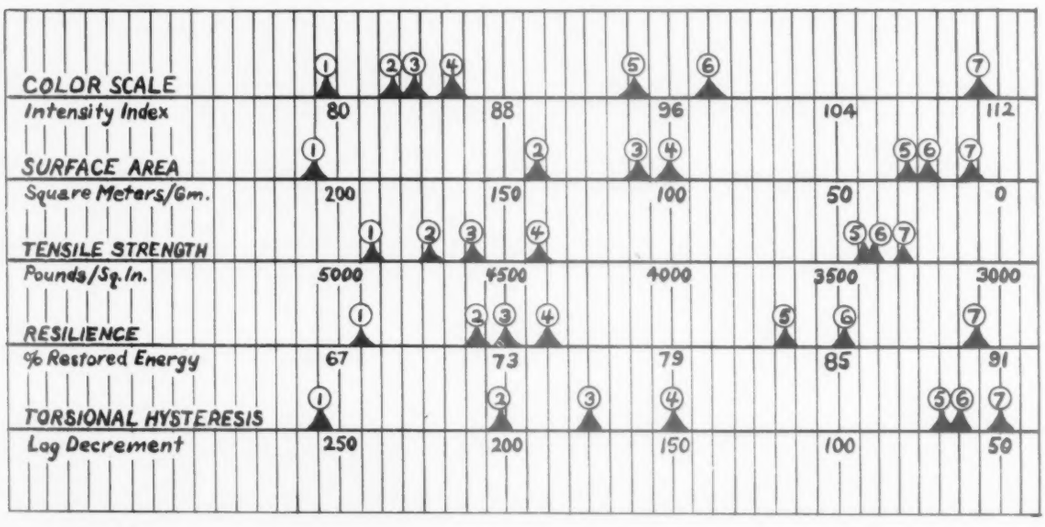
Comparing Compounding Characteristics

A chart of comparison scales of various types and grades of carbon blacks will give visual evidence of their compounding characteristics with rubber (See Fig. 1). The several tests from which these data may be obtained are explained briefly below.

The color scale, determined by comparison of a sample of black with a standard black chosen arbitrarily—there are several different methods of attaining this comparison—indicates how black the sample is. On the scale used herein the lower the index the "blacker" the black, e.g., whether sample or standard is absorbing the greatest amount of light; scale numbers are arbitrary and distances logarithmic.

Surface area is the total surface of a one-

Fig. 1—Rubber Compounding Characteristics of Various Types of Carbon Black



Legend of numbers in circles:

1—Hard processing channel carbon black.
2—Medium-hard processing channel carbon black.
3—Medium processing channel carbon black.
4—Easy processing channel carbon black.
5 and 6—Representative grades of semi-reinforcing furnace blacks.
7—Representative grade of thermally-cracked carbon black.

gram sample of black; this may be determined in various ways, depending on the laboratory. From this test chemical nature of available surface is determined; a factor in predicting properties of rubber compounded from the sample.

Tensile strength is the strength of a rubber when blended with a carbon black sample. The kind of rubber and proportions of other blending ingredients and conditions of cure are kept as constant as possible, type and grade of black being the only permissible variable.

Resilience measures the rebound or "snap back" of a rubber compounded with a carbon black sample. It may be measured by bouncing a pendulum against a sample block, determining how nearly the pendulum returns to its starting position. The absorption of kinetic energy results in generation of internal heat, which, if sufficiently great, seriously impairs the blend's usefulness.

Torsional hysteresis is a measure of fatigue brought about by generation of internal heat; the lower the value the lesser the fatigue. One method of measurement is by rotating a rubber pill rapidly and eccentrically between two flat plates. Extent of the pill's flattening gives a composite indication of hysteresis, thermal conductivity and thermoplasticity.

There are several other tests which also indicate what to expect from a given blend of black and rubber.

It will be readily apparent from inspection of the data in Fig. 1 that there are hiatuses between the most highly reinforcing blacks (channel), the semi-reinforcing blacks (furnace) and the non-reinforcing black (thermally-cracked). Of the 7 carbon blacks compared, channels are represented by points 1 through 4, furnace by points 5 and 6, and thermally-cracked by point 7.

Investigations have proven that so far as the properties of a rubber blended with various blacks are concerned, the gap between the "hardest" and "softest" channel blacks, points 1 and 4, respectively, is relatively very great. Thus, when the scale of properties is expanded by addition of furnace and thermally-cracked blacks, a very wide variety of compounding characteristics is available to rubber manufacturers. Which grades they will eventually select in the new rubber program will depend on the use to which the product is to be put and on the continuing research in the properties and characteristics of synthetic rubber itself.

Stockpiles Are Vital

To supply anticipated needs of both channel and furnace black, the industry was authorized to construct 7 furnace black plants under AA2-x priority with a total value between $4,000,000 and $5,000,000. Of these plants, some are now operating while others still are under construction. Four companies produce 85% of U. S. carbon black production, the balance being divided among 7 small companies. Value of production in 1942 was in the neighborhood of $15,000,000. Production outside this country is negligible by comparison. If the goal of 1,100,000 tons annually of synthetic rubber set in the Baruch committee report is reached, the quantity of carbon black which will be required will be definitely in excess of existing capacity and that of plants under construction, several authorities have estimated. To this demand must also be added that for the manufacture of printing inks, pigments and other specialty products.

The industry's planning for carbon black production has been complicated by the changing synthetic rubber production picture. As one company's general manager puts it: "It would be criminal to fail to supply the need, and equally criminal to use critical materials in constructing facilities to supply more than is necessary."

To meet anticipated needs, the industry is accumulating large stockpiles of the various grades of channel carbon black to meet the first shock of 1943-44 demand for compounding with synthetic rubber. Current production without these stockpiles would be inadequate. Furnace black stocks now are "hand-to-mouth" with usage restricted under orders of the War Production Board, but construction program progress will assure adequate supplies as synthetic rubber becomes available. At one plant in the Texas Panhandle, the author saw, stored and awaiting shipment, more than 25,000,000 lbs. of channel black.

Adding to stockpile and production worries also is the effect of continuing research and new development in compounding synthetic rubber on carbon black requirements. New types may be demanded which would lessen the value of a portion of present production and stocks.

How Channel Black Is Made

Channel black, as has been indicated above, is produced by burning natural gas in a supply of oxygen insufficient to support complete combustion, the flame impinging on a collect-

Typical channel carbon black plant in the southwest. Warehouses and packing and car loading facilities are in the foreground. The rows of sheds in the background house millions of tiny gas flames, the combustion of which deposits the black on iron surfaces

ing surface. In practice this is attained by housing millions of tiny flames in thousands of small, frying-hot sheet-iron buildings. Control of reinforcing properties is secured through adjustment of the air supply, distance of the lava burner-tip from the channel, design of the tip, and variations in the fuel supply itself. The black, about 1 oz. per day per flame, is scraped into hoppers from the slowly moving channel collecting surfaces, then transferred by screw-conveyor and air lift to the packing house.

In the packing house, black is cyclone-separated from any grit, sand and other foreign material until the final product will pass a 325-mesh screen with less than 0.1% retention. After separation the apparent density of the flocculent black is increased by agitation, which in effect removes much of the entrained air, packing the particles more closely together. Product must also pass surface and color tests, as well as the compounding tests previously discussed.

To a large extent, the product is supplied to the consumer in "dustless" form, the black from the agitators being formed by a variety of processes into small granular spheroids. Material then is stored in huge "silos" and overhead tanks until it is ready to be run into compartmented railroad cars, or packed into bags and stacked in huge warehouses.

Furnace Black Manufacture

Furnace black is produced, as the name implies, in furnaces, the type depending on the manufacturer. Gas (or vaporized carbonaceous liquids) is used as the fuel to provide the heat to crack a part of the gas supplied to the furnace. Regulated amounts of air are supplied with the gas so that combustion is controlled. There are several methods of decomposing the carbonaceous material, each with varying claims for efficiency and other advantages. The method used by one large manufacturer is described here.

By means of a specially constructed burner gas and air are introduced into the furnace through slots in alternate, flat, horizontal sheets. The streams enter the furnace at the same velocity, complete combustion taking place at the interfaces of the many laminar gas and air streams. By regulating the amount of air introduced, a definite percent of the gas can be consumed in this complete combustion zone, thereby supplying heat to decompose the remainder of the gas. A number of structural and operating variations are used to affect or regulate the quality and quantity of furnace black produced by this method. A number of the above-described burners may be attached to a furnace, thereby forming a "unit". A number of these units make up a commercial plant.

Temperature of the gases in the furnace varies between 2200°F. and 2500°F., and in effect some of the gas is decomposed or cracked while the balance is consumed. Components of the flue gases are nitrogen, hydrogen, carbon, various oxides of carbon, and sometimes, depending on operating procedures, "acetone extractable" substances which are the result of cracking and polymerization.

Flue gases are led through a horizontal stack to a cooler, where water is sprayed into the gases. The gas temperature is not sufficiently low to permit condensation of water at any time, the effect being that of cooling the gases to 300-500°F. through vaporizing the water. From the cooler, gases pass to a Cottrell precipitator, where the particles are agglomerated and "knocked down," to be recovered in cyclone collectors. From here on, the process is similar to the packing and bagging described previously for channel blacks.

A diagram of one furnace black process is shown in Fig. 2.

Thermally-Cracked Black

Thermally-cracked carbon black is produced by injecting gases or carbonaceous vapors into a furnace filled with heated brick checkerwork. Gases may or may not be diluted with inert gases, depending on furnace design and the grade of black desired. Gases to be cracked are initially heated by the checkerwork to temperatures from 2200°F to 2600°F. but this temperature may fall to as low as 1500°F. as the gases reach the stack. There are several ways of heating the checkerwork, one being to begin with a combustible mixture of gas and air, heating until operating temperature is reached and then cutting off the air; another uses a flame in the furnace at all times, the gases to be cracked being injected separately into the furnace, so that they will pass through the flame on their way to the stack.

Recovery of the carbon from the stack gases is again by combined Cottrell precipitators and cyclone separators, with operations similar to channel or furnace black for storing and shipping.

Natural Gas Is Best Fuel

Most carbon black manufacturers maintain the best raw material is residue gas from natural gasoline plants, or raw natural gas. Objections to using liquids such as gasoline and kerosine are three: The first is unfavorable economics, based on the cost of the raw materials and the delivered costs of the finished product. These liquid raw materials which can be used for black production also are logical raw materials for the refiner to use in manufacture of improved motor fuels or aviation gasoline base stocks. Hence many carbon black manufacturers hesitate to install equipment to use these materials as long as natural gas is available. Putting it another way, from 1000 cu. ft. of natural gas of 0.70 gravity, a furnace process may make 12 to 15 lbs. of carbon black at a cost of perhaps 3c for gas. From a gallon of natural gasoline, costing the same or less, not more than 3 lbs. of carbon black can be recovered.

The second reason for not using carbonaceous liquids is that to date there is only a negligible difference in the quality of furnace blacks they produce as compared with channel blacks. This admittedly may change in light of future knowledge. The third is the tendency of blacks produced from liquid fuels to be contaminated with oily and sometimes odorous by-products which render the product less suitable for blending with synthetic rubber.

Yields are of the order of 3 to 20 lbs. of furnace blacks per 1000 cu. ft. of natural gas; 1 to 5 lbs. of channel blacks. Data for thermally-cracked blacks are confidential, but are somewhat higher than for furnace blacks.

This wide difference in yields should not be construed to mean that channel blacks are less efficiently produced than furnace blacks; rather it is due to the inherent differences in the two types of blacks. This is also true of the variation in yields of each type. The harder, smaller particle in each case is produced in the smaller quantity per 1000 cu. ft. of gas consumed.

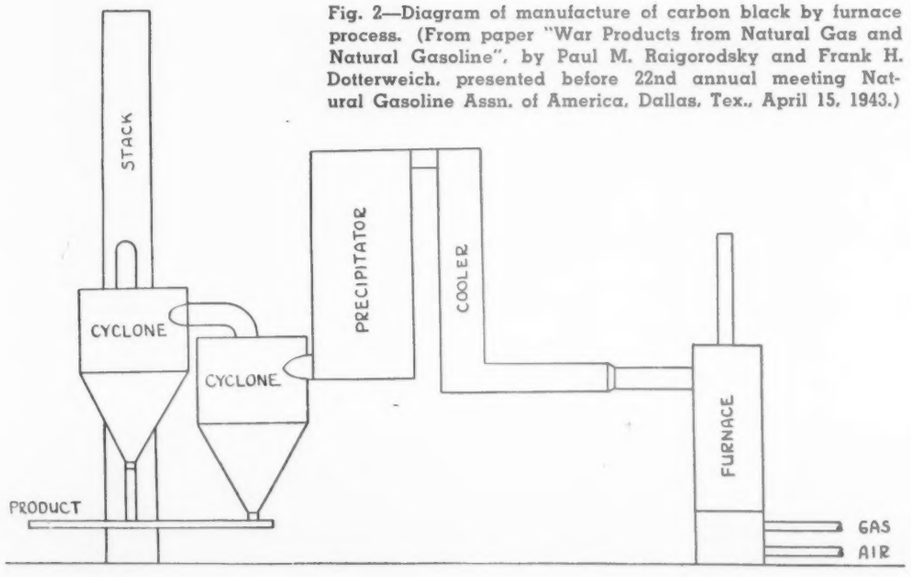


Fig. 2—Diagram of manufacture of carbon black by furnace process. (From paper "War Products from Natural Gas and Natural Gasoline", by Paul M. Raigorodsky and Frank H. Dotterweich, presented before 22nd annual meeting Natural Gasoline Assn. of America, Dallas, Tex., April 15, 1943.)

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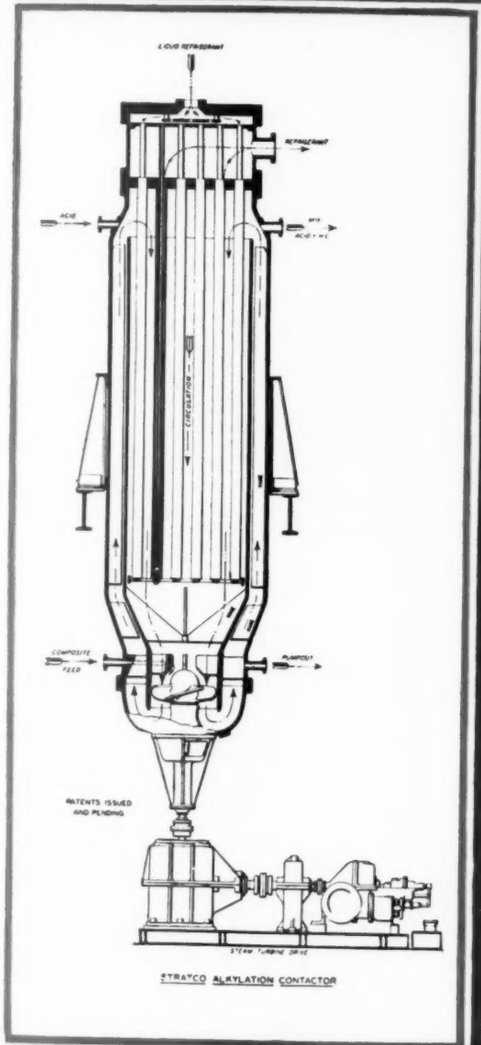

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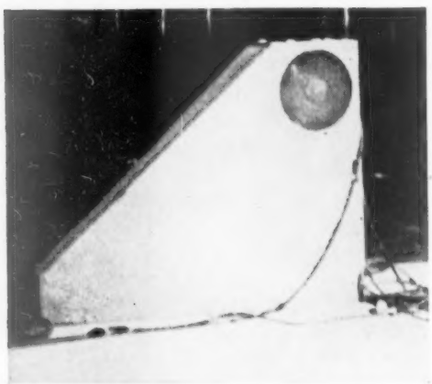
Sheet Linings of Synthetic Rubber For Concrete Gasoline Tanks*

In installing Thiokol synthetic rubber linings in concrete tanks for aviation gasoline, the walls are covered first, the sheets being lapped over 6 in. onto the floor. After the floor has been covered, a corner strip is superimposed over the joint

EARLY in 1940 the Bureau of Yards and Docks of the Navy Department began to visualize a possible shortage of steel plate for purposes other than war construction for which there were no available substitutes. The increased demand for greater fuel storage facilities and the advisability of protecting storage areas by underground concealment pointed to a huge demand for structural steel in the construction of these storage facilities for oils and gasolines. In an effort to institute savings in the use of this much needed steel, studies on the use of reinforced concrete tanks for fuel storage purposes were made.

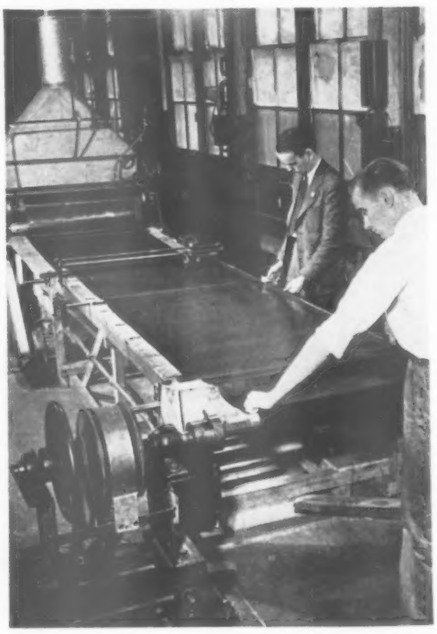


Special ventilators are used to exhaust the solvent from the adhesive with which the synthetic rubber lining is cemented to the walls, floor and columns in the underground concrete storage tanks now being used by the Navy

The answer obtained was the use of what is termed prestressed** concrete tanks, which are now being installed in Naval bases throughout continental U. S. While structural obstacles had to be overcome in the construction of these tanks, the Bureau of Yards and Docks engineers were convinced that concrete underground storage tanks could be constructed to successfully retain the heavy fuels. The matter of retaining the less viscous fuels such as diesel oil and aviation gasoline presented a serious problem.

This problem was solved and credit for the successful adaptation of the use of concrete tanks for the storage of gasoline resulted from the development of synthetic linings. Among these linings was a thin sheet of synthetic rubber known as Thiokol FA, which requires application to walls, floors, and columns like wallpaper. This type of lining protected the gasoline from a drop in octane rating which may have occurred by being exposed to the alkalies present in the concrete. In addition to this and to reducing the formation of gum in the gasoline, the sheeting also serves to prevent loss of fuel by seepage through porosity in the concrete walls.

The synthetic Thiokol FA sheet linings used by the Bureau of Yards and Docks were formulated by the Boston Woven Hose and Rubber Co. after much experimentation with adhesives for the application of the linings to the con-



Final step in the fabrication of the Thiokol FA linings for the Navy's underground concrete oil storage tanks. After passing through the buffer, upper left, the sheet passes under an automatic measuring device and over a lighted box, lower right, where it is inspected for pinholes. An inspector, right center is checking the thickness of the sheet

* Prepared by Boston Woven Hose & Rubber Co.

** Type of prestressed concrete tank used for aboveground storage by a Canadian oil company was described in "100,000-Barrel Concrete Tanks for Fuel Oil Built by 'Prestressing' Reinforcing Rods", NATIONAL PETROLEUM NEWS, Technical Section, Jan. 6, 1943, pg. R-18.

Crude oil goes to war

Today the available supply of crude oil is limited and so is the market for peacetime products

But the demand for war products that can be made from that crude oil is unlimited

Uncle Sam is the preferred customer He needs 100-octane gasoline, synthetic rubber and toluene in enormous volume

Don't you think refiners who can make those products—or their components—efficiently will have first call on crude if there isn't enough to go round?

It's wise and it's patriotic to get into war production as soon as you can

And it's wise to call on Universal refining specialists to help you They are helping to convert peacetime units to wartime operation right along

All Universal processes, as well as Universal experience and know how are at your service—at the service of every refiner

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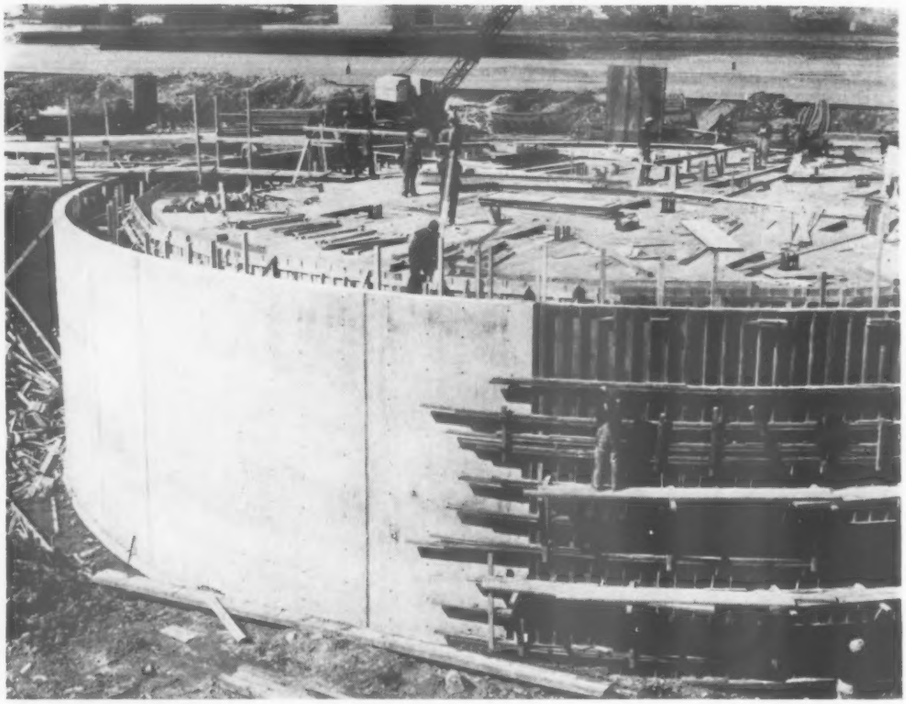
crete sidewalls, floors, and columns of the tank. This lining consists of a high density sheet of a polysulfide synthetic rubber which may also be used for the fabrication of hose and other solvents resistant specialty products. The sheets used in the tank construction were required to be made in two thicknesses, .025 in. for sidewalls and columns, and .03 in. for floor coverings. The sheets are 38 ins. wide and made in 100-yd. rolls. The front surface is smooth, except for a 3 in. strip along one side, which like the back surface is rough to provide better lap adhesion.

Production of the lining involved several new fabrication problems. After the crude stock is mixed, it is calendered into sheets and wound in rolls with an interliner to prevent sticking. Without removing the interliner it is aircured for 15 minutes at 320° F. The interlining is then removed and the sheet fed into a continuous curing press. It is this process, which takes about two minutes, that gives the sheeting its high density and strength characteristics. The final step is buffing and measuring, followed by inspection over a light box. Every foot of the material is so inspected, since the slightest pinhole would permit gasoline to come in contact with the concrete.

Installation of the lining in many ways resembles hanging wallpaper, but actually is a far more complicated operation. After all holes have been filled and all projections removed from the concrete surfaces, walls, columns and floors are coated with a special synthetic rubber cement applied with a notched trowel. After this has thoroughly dried a second coat is applied to that portion of the wall which is to be lined immediately, and to the back of the lining. Ventilators are then set up to exhaust the solvent from the cement. When it reaches just the right stage of tackiness, the strip of lining is hung, starting at the top and allowing a 6-in. overlap onto the floor. Great care has to be taken to prevent the sheet from coming into contact with the wall out of place since the adhesion of the cement is so great that it it almost impossible to unstick it. The sheets are brushed into contact with heavy brushes to insure perfect adhesion at all points.



Underground prestressed concrete storage tanks, of the type shown here under construction, are now being installed by the Navy at many points for storage of light oils as well as fuel oils. Development of a synthetic rubber sheet lining enables these concrete tanks to be successfully used for storing aviation gasoline, it is said. When completed, dirt will be filled around the sides and over the top to make the tank entirely invisible from the air

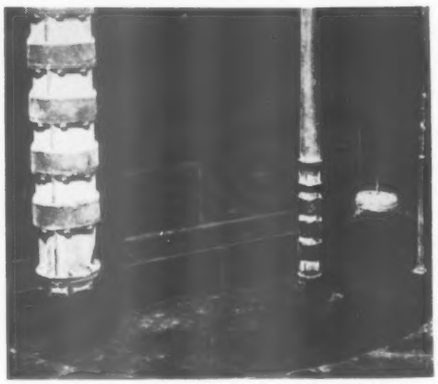
Even the columns of the concrete underground tanks used by the Navy for storing aviation gasoline are covered with sheeting of synthetic rubber. One advantage of the lining is said to be that it protects the gasoline from coming in contact with free alkalies in the concrete which might lower its octane rating

After the walls are covered with each strip overlapping the next by 3 ins., areas around ladders, pipes and other protuberances are carefully patched so that not one square inch of the bare concrete is left exposed. The concrete columns supporting the roof are then similarly covered.

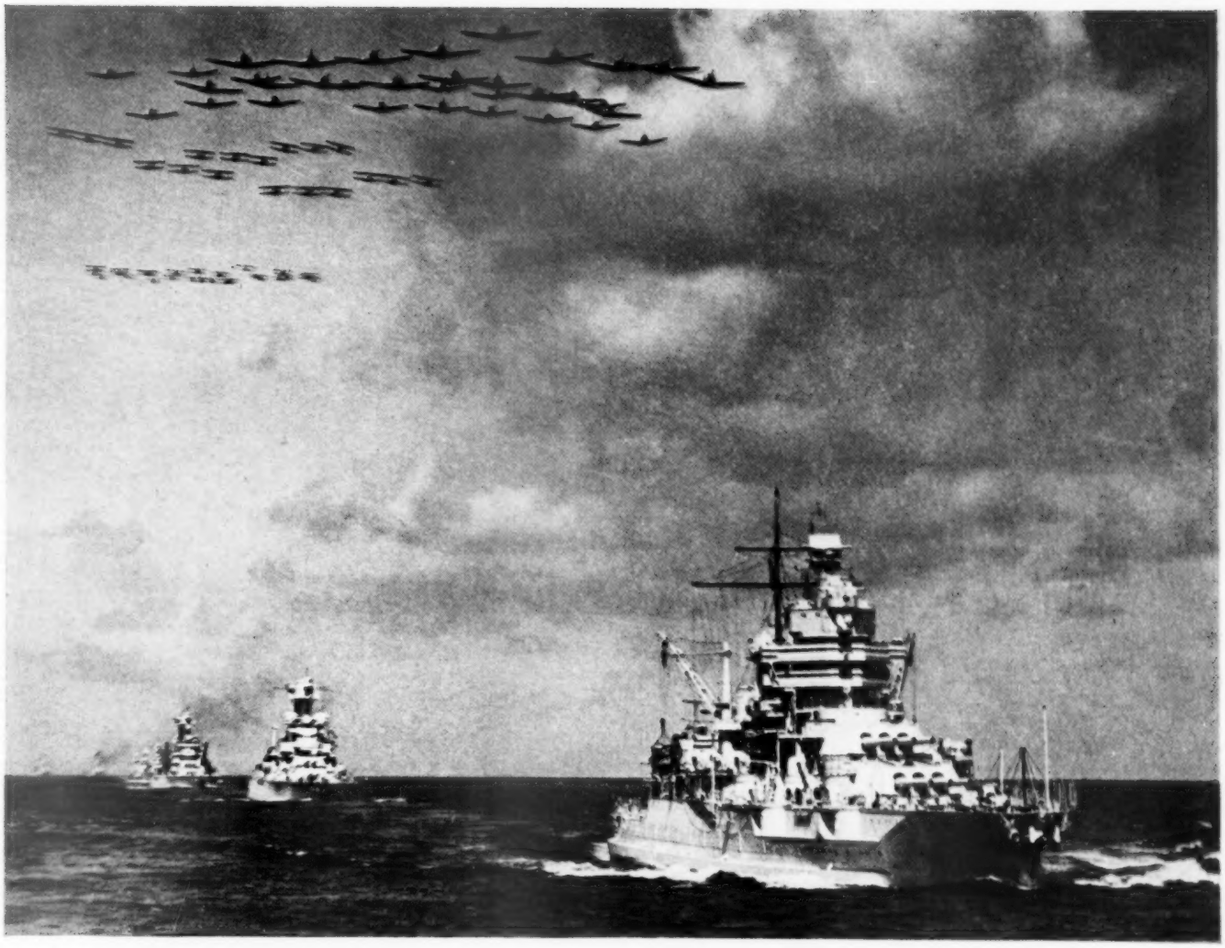
The final step is covering the floor. A slightly thicker sheeting is used, and instead of running strips all the way across the bottom of the tank, pieces of not more than 10 ft. in length are patched together in the manner of flooring in order to insure a perfect fit around the base of the columns. A 9-in. wide strip is then superimposed on the joint where the walls meet the floor.

In addition to providing resistance to aromatic gasoline and the water which is bound to collect in the bottom of the tank, the synthetic rubber sheeting offers the added advantage of forming a container which remains leakproof even in cases where the concrete wall cracks due to stresses, ground shifts or temperature changes.

At the present time tank farms are being constructed using Thiokol sheet lining and other synthetic linings for concrete tanks in order to build up the gasoline and fuel oil reserve storage for use of the Naval forces. Completely underground and indistinguishable from the air, these concrete tanks not only represent a vast saving in vital steel plate, but offer the added advantage of being practically invulnerable to fire from normal operational hazards, and because of concealment and disposition reduces possible loss from bombing attacks to a minimum.



The sump at the base of the tank must be completely lined when it is to be used for storing gasoline. Fitting the lining around such areas is a major installation problem



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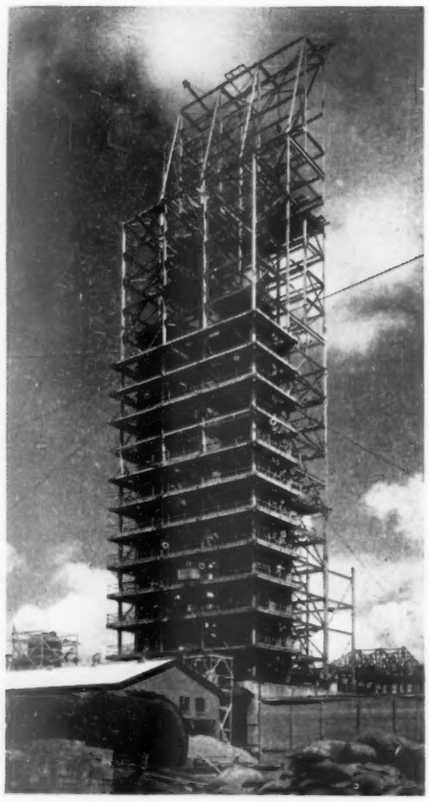

New Thermofor Catalytic Cracking plant under construction

Producing Wartime Aviation Gas By Improved Houdry Catalytic Proc

The accompanying article is based on a visit of two members of *National Petroleum News* editorial staff to the refinery of the Sun Oil Co. at Marcus Hook, Pa., and the laboratories of the Houdry Process Corp., to study late developments with this process for the manufacture of improved aviation gasoline and motor fuels for wartime service. Cooperation of the engineers of both companies is acknowledged in making available operating technique and other data.

ACTIVITIES and developments now in progress at the Sun Oil Co.'s Marcus Hook refinery illustrate achievements of the group working on the Houdry catalytic processes. At this refinery, the results obtained by research of Sun, the Socony-Vacuum Oil Co., and the Houdry Process Corp. are being integrated into a demonstration of their effectiveness on a large commercial scale.

The development work is based on the original ingenious and extensive research of Eugene J. Houdry, inventor of the Houdry catalytic cracking process. Specifically, the present wartime objective is to build high octane motor and aviation fuels which contain the correct concentration of desirable hydrocarbons in the proper distribution by simple operation, avoiding costly and complicated processes of producing organic compounds.

Realizing the shortcomings of thermal cracking, especially for the manufacture of 100-octane aviation fuels, Houdry visualized years ago that, by proper choice of selective catalysts, it should be possible to control cracking conditions so effectively that stable hydrocarbon structures would be formed which possess high octane value and high lead susceptibility. His efforts developed the first commercially practical catalytic cracking process to be widely installed. The development work required for commercial manufacture of aviation fuel by the Houdry process was first carried out in refineries of the two producing companies associated with Houdry (Socony-Vacuum and Sun Oil Co.)

A study of the Houdry plant operations at this large refinery of Sun Oil Co. and a visit to the Houdry Laboratories of the Catalytic Development Co. is illustrative of the progress made since April, 1937, when the first Houdry unit was placed in operation at that plant. Each step has resulted in important improvements, accelerated by the war demand for continually increasing quantities of the highest obtainable octane value of aviation gasoline. Today Houdry and his researchers are confident that soon they will be able to contribute to our war efforts an ideal aviation gasoline that will contain only the best desirable compounds pure in their relative boiling ranges.

Improvements Discussed

Equipment and operations of several Houdry catalytic cracking plants installed at refineries of the Sun and Socony-Vacuum oil companies have been previously described in the trade literature and in papers delivered at meetings of the American Petroleum Institute and technical societies.[*1] This article will discuss the outstanding developments and improvements since commercial operations of the Houdry catalytic cracking process began in 1936.

In designing the Houdry plants preservation and utilization of heat stored during the regeneration process of the catalyst, which is exothermic and gives off surplus heat, prevailed in the minds of the engineers and they have succeeded in designing simple and highly efficient equipment to produce economically the highest grades of motor and aviation fuels available today.

Sun Oil Co. employs the static catalyst process in all of its presently operating Houdry plants. The catalyst is placed into a vertical cylindrical vessel, called a case or reactor, and stays there for the duration of its useful life. The reactors in the catalytic cracking plants are provided in groups of three. In each group, at a given time, one is cracking oil, one is being regenerated by burning off the carbonaceous deposit on the catalyst by a stream of air and the third one is purged of either air or oil vapor. In Sun's 12-case plants, a group of 6 reactors each form a system, in which two cases are manifolded to operate as one, so that two cases in each system are in the same operation at one time.

The size of the reactor and the number of groups depend on the charging capacity of the plant, the type of cracking stock, operating conditions and characteristics desired for the cracked motor or aviation fuel. Charging stocks may be crude, fractions or residues thereof. At the present time all of Sun Oil Co.'s Houdry plants are operated to produce aviation fuels from reduced crude, from which the heavy tars have been separated, gas oil or heavy distillates.

More Active Catalysts Used

The formerly used clay catalyst has been replaced by more active synthetic catalysts, manufactured in large plants operated by the Houdry Process Corp. The raw material is plentiful and the catalysts can be produced cheaply. These synthetic catalysts effect higher yields and higher octane aviation gasoline, which has a low percentage of unsaturates.

In the static catalytic process the flow of oil vapors is directed to a succession of stationary catalyst beds by a system of automatically motor-operated, rising stem valves, placed in groups at the upper and lower level of the case structure in the oil, steam and air lines which enter and leave the catalyst cases. A cycle timer, a type developed by Sun Oil Co. engineers, is the "brain" of this operation. It is located on a large instrument panel in the operating room and automatically controls the operation of these valves and thereby the individual phases of the operating cycle.

A system of colored lights on the control board enables the operators to check at a glance the exact status of each phase of the cycle, and an alarm system automatically stops operations immediately and prevents air and oil vapors from mixing and causing a possible explosion and fire in case any of the motor operated valves should stick. Only 5 operators besides one foreman are required

*See References.

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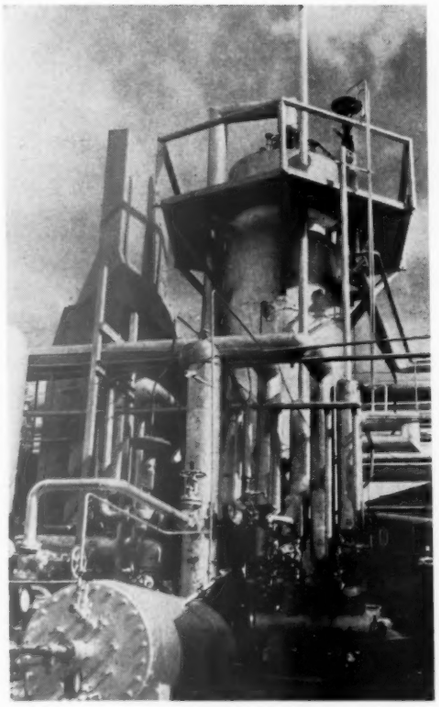
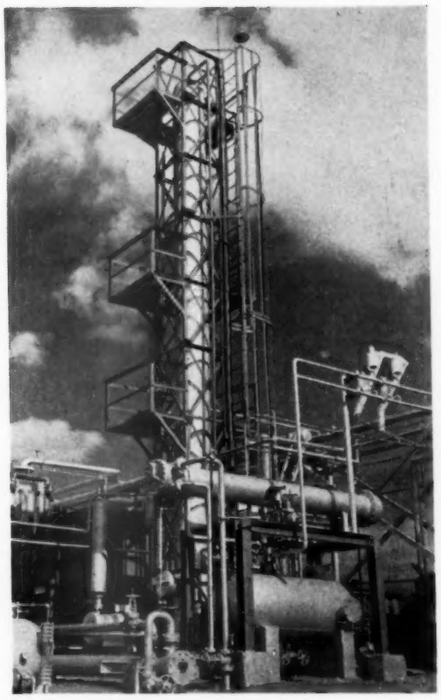




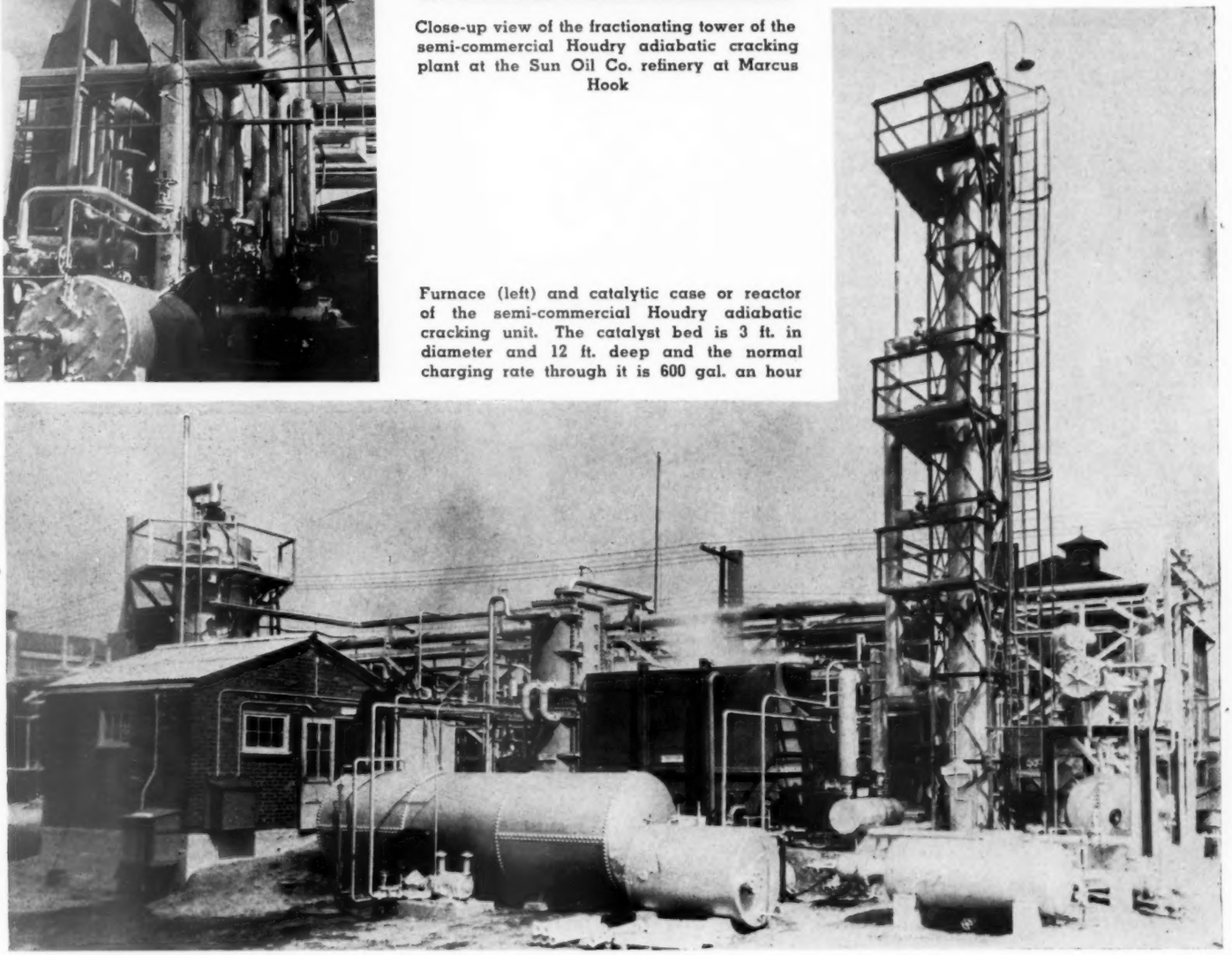
Close-up view of the fractionating tower of the semi-commercial Houdry adiabatic cracking plant at the Sun Oil Co. refinery at Marcus Hook

for a unit charging 20,000 bbls. of cracking stock per day.

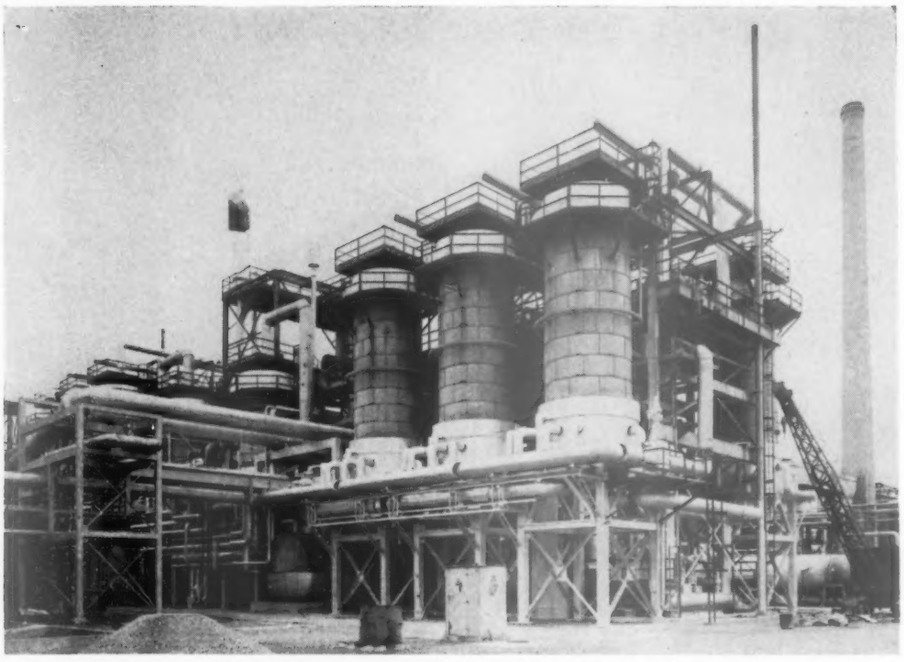
The regeneration period lasts 10 minutes, then the air evacuation line opens and the regenerating air is evacuated and the case is under vacuum. At this point the oil repressuring valve is opened and synthetic crude vapors flow into the case and bring it up to the on-stream pressure. The purging and pressuring phase takes from 5 to 6 minutes, when the oil repressuring valve closes and the oil-inlet and outlet valves open. The case stays on stream for about 10 minutes, when both inlet and outlet valves close. Then oil purging or oil evacuation starts and purging steam is introduced to more thoroughly sweep all the oil vapors from the case. Then the steam and vacuum valve closes and the air repressure valve opens, allowing regeneration gases to flow into the case to bring it up to regeneration pressure. This preparatory step for regeneration of the catalyst requires from 5 to 6 minutes, whereupon the air outlet and inlet valves open and burning of the carbon deposit on the catalyst takes place.

The Houdry static catalyst process has, in

Furnace (left) and catalytic case or reactor of the semi-commercial Houdry adiabatic cracking unit. The catalyst bed is 3 ft. in diameter and 12 ft. deep and the normal charging rate through it is 600 gal. an hour



Layout of the semi-commercial Houdry adiabatic cracking plant now in operation at the Marcus Hook refinery of Sun Oil Co. The unit consists of eight 11,000-gal. tanks for charging stock, intermediate products and finished aviation fuel; a furnace for heating and vaporizing the fuel and a catalyst vessel or reactor (left background); fractionating tower (right) and necessary condensers, coolers, reboilers, pumps, control instruments and piping to produce a treated stabilized and fractionated improved fuel from virgin charging stock. Purpose of this plant is to prove out the process design, engineering and material specifications for the immediate utilization of full scale plants



Houdry catalytic cracking No. 10-3 at the Marcus Hook refinery of Sun Oil Co. This cracker has 12 catalyst cases and since our entry into the war, has contributed more to the production of catalytic aviation gasoline base stock than any other in the world, it is stated

the opinion of Sun Oil Co.'s engineers, certain advantages in eliminating some of the problems in design and operations inherent in other methods of applying catalysts to cracking. It avoids the separation of many tons each hour of solid material from the oil vapors, and again from the regeneration gases. There is no breakdown of the solid catalyst particles into finer ones with unavoidable loss in separators. Hence no continuous replenishment of the catalyst volume with fresh catalyst at additional operating expenses is required. No wear and tear of the process equipment due to erosion is caused by the high velocity of moving solid particles. Danger of stoppage of the catalyst flow due to packing or bridging is also eliminated.

This static process supplies sufficient heat for the reaction without overheating the catalyst or oil or both. The reactors are equipped in the catalytic zone with three systems of steel tubes arranged in pattern. The oil vapors enter at the bottom of the case and flow thru the insert tubes, which have openings on top and bottom. These tubes are inserted in distributor tubes provided with orifices, by means of which the vapors are correctly distributed and intimately mixed with the catalyzer. The synthetic crude vapors are collected in perforated inverted tubes, rolled into the top sheet and leave the case at the top.

The third system of tubes is equipped with fins and molten salt is circulated by means of salt pumps thru these tubes. The flow is supported by vacuum on the outlet side near the bottom of the case wall. This method maintains close heat control in the catalyst bed and removes excess heat created during the regeneration period, which is utilized for generation of high pressure steam in vertical flash boilers, for process operation and electric power, and for preheating the oil before entering the cracking heater. At the same time a large amount of heat is retained by these heat transfer surfaces in the reactor and given up to the oil vapors during the cracking period.

The static process uses a continuous flow of both oil and air. The intermittent action of the individual cases is obtained by switching from one to another, with no interruption of either oil or air flow. In respect to flow in and out of the unit, the process is continuous.

Various types of operation of the Houdry catalytic process are described as follows:

1. One-Step Operation

In the *single step or one-pass operation*, the synthetic crude vapors from the reduced crude or gas oil charge on leaving the reactor are transferred to a conventional fractionating tower. The overhead light distillate passes first thru condensing equipment and a gas separator, then to a stabilizer. Two side streams yield light catalytic gas oil or recycle stock and heavy naphtha. Heavy gas oil is withdrawn thru a stripper from the bottom of the tower.

Desulfurization takes place during the catalytic reaction and the side streams are cleaner than any thermal cracked recycle stock. With the new synthetic type of Houdry catalyst single-pass training grade aviation gasolines, ranging from 30% to 40% in yield, can be produced from low sulfur gas oils or naphthas of paraffinic, mixed base and naphthenic origin. Most of these gasolines are sweet and non-corrosive. Gasolines from high-sulfur stocks need treating.

The side streams from these operations are relatively high-octane motor naphtha and catalytic gas oil or recycle stock; the bottom product is light fuel oil.

100-octane gasoline may be obtained by blending with tetraethyl lead and alkylate or isooctanes.

These types of Houdry aviation gasolines, both leaded and unleaded and without addition of inhibitors, show good long time storage stability with no appreciable change in the accelerated gum content. They contain predominantly isoparaffins, with lesser quantities of olefins, aromatics and naphthenes.

2. Two-Step Operation.

A more recent development which made the production of improved catalytic aviation gasoline from a wide range of charging stocks possible, is the two-step operation. The first step is the catalytic cracking of heavy distillates, such as gas oils, heavy naphthas, or debutanized motor gasoline, which is followed by catalytic treating performed in the same or similar equipment as a second step.

Catalytic treating may also be successfully applied to single-pass Houdry aviation gasoline, producing considerable improvement of its properties.

In so-called "blocked" operations the catalytic cracking unit may first be used as a cracker, the debutanized first-pass gasoline stored until a sufficient amount has been accumulated for a treating run and catalytic treating carried out in the same unit. In cases where the capacity of a refinery justifies the installation of a separate treating plant, a smaller 2 or 3-case unit will increase production of aviation gasoline. Operations are similar in both passes. A somewhat modified operation may have to be used in the treating step, depending on the characteristics of the aviation distillate and the yields desired.

Two-step operations increase the concentration of desirable compounds in the finished aviation gasoline. The content of aromatic compounds is higher; usually there is a slight increase in isopentane, providing better volatility. Impurities are almost completely removed. The second pass gives a notable increase in quality, lowering the alkylate required to blend to 100-octane number.

3. Catalytic-Thermal-Catalytic Operation.

In order to further increase the yield of aviation gasoline, the catalytic motor naphtha from the first catalytic unit is thermally cracked in an available thermo-cracking unit and the overhead product from this operation is passed thru a second catalytic cracking unit. This operation produces additional aviation gasoline, which when blended with the two-pass product and alkylate fully meets present aviation gasoline specifications.

4. Catalytic Reforming.

The Houdry catalytic cracking process may be applied to the reforming of straight-run gasoline and naphtha having a final boiling point up to 500°F. into aviation base gasoline. High yields of high-octane, chemically stable aviation base of good susceptibility to blending materials and TEL are obtained, so that only a minimum of these agents is required to reach the standards of 100-octane aviation gasoline.

The charging stock is vaporized in a still and

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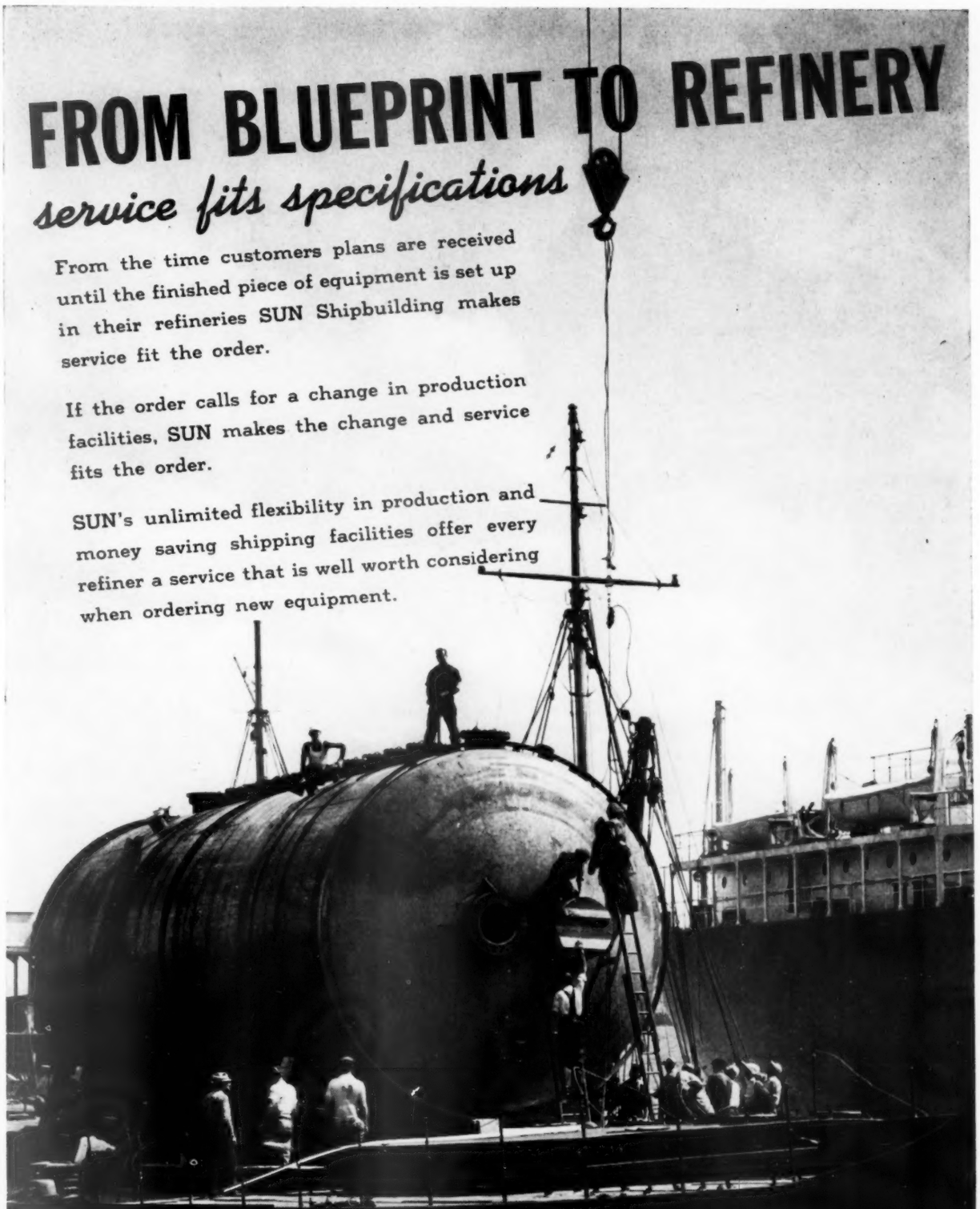

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the vapors, heated to about 850°F., pass directly to the catalyst chamber and then to a fractionating tower, where they are separated into aviation gasoline, naphtha, gas oil and gas. Yields of aviation gasoline as high as 60% by volume may be obtained.

A catalytic reforming unit of 8000-bbl. daily charging capacity requires only 3 cases and is very flexible. It may be also used for catalytic cracking of gas oil, producing 35% to 40% of 80 octane aviation base or 50% to 56% of 80 octane motor fuels; for production of motor fuels from naphtha with yields of 83% to 94%; finally as a catalytic treating unit.

5. Adiabatic Catalytic Cracking Process.

The latest and most important technical improvement is based on the more effective utilization of part of the heat generated during the combustion of the carbon deposit on the catalyst. The process is not fully adiabatic and the heat balance is not as precise as this thermodynamic term implies.

In the catalytic operations previously described the temperature in the reactor is held at approximately 825° to 850°F. About 20% of this heat is used for heat reaction during the cracking period, while 80% is absorbed by the molten salt.

In the adiabatic catalytic cracking process somewhat higher temperatures prevail. No molten salt is circulated to supply heat for the catalytic reaction or to remove the exothermic heat generated during the combustion of the coke deposit on the catalyzer. The required amount of this heat is stored in the catalytic mass to be available for cracking the oil vapors; part is removed in the air stream and used for steam and power generation; and the largest portion is carried away in the oil vapors leaving the catalyst vessel and utilized for heat exchange to preheat the feed.

The catalytic cycle is the same in all types of Houdry processes. The adiabatic process differs from the normal operations in the manner in which the heat is applied. Elimination of the auxiliary equipment for molten salt circulation and utilization of the principle of heat storage simplifies the design of the unit and produces important economies in investment for construction and in operating costs.

The cracking case is of simple design. It is an empty cylindrical carbon steel vessel, having an inlet at the top and an outlet at the bottom, and lined with refractory material and insulated on the outside to prevent undue heat loss. The catalyst is supported by a perforated horizontal plate. The thin gage sheet liner inside of the case and the catalyst supporting plate are the only metals subjected to corrosion, which may require alloy steel in case sour cracking stocks are used.

The use of special catalysts, made from materials available cheaply and in large quantities, promotes the cracking reaction desired and the storing of part of the regeneration heat until it is required for cracking.

This process has especial value for cracking very refractory light stocks, such as straight-run heavy naphtha, kerosine, low boiling range thermo-cracked naphthas. Refiners usually have these materials available in considerable quantities, so that no additional crude supply for cracking stock is needed and no burden is placed on our already heavily crowded transportation systems. Actually this process promises to produce large volumes of aviation fuel of a superior standard than the 100-octane aviation gasoline now available. The process itself is, in many ways, quite similar to the other types of Houdry operations. The vapors enter at the top of the reactor and leave at the bottom. The same 30-minute cycle is employed.

In the semi-commercial plant in operation at this Sun Oil Co. refinery 600 gals. are charged hourly to the case. This unit is designed for blocked-out operations, has only one fractionating tower and the same reactor is used also for catalytic treating. It requires therefore 4 separate steps to produce a treated, stabilized and fractionated super-aviation fuel, while in a commercial plant a sufficient number of reactors and towers will be provided for a two-pass operation.

In the first-step operation the synthetic crude vapors pass to the fractionating tower, where first-pass aviation gasoline distillate is taken overhead, condensed and debutanized. Catalytic motor gasoline is withdrawn as a side stream and the bottom product is a vapor phase cracking or recycle stock.

In the second step the debutanized first-pass material is passed thru the furnace into the fractionating tower and raw aviation stock separated and accumulated for catalytic treating operations.

The third step consists of vaporizing this stock and passing it thru the reactor under controlled conditions of pressure and temperature suitable for treating and to the fractionating tower, where it is also debutanized. The overhead stream of raw aviation fuel is accumulated, and then vaporized in the heater, passed to the tower and fractionated.

The overhead stream from this operation is finished super-aviation fuel; the side stream, catalytic motor gasoline; the bottom product, tar polymers.

The process is carried out under carefully selected and controlled cracking conditions.

The aviation fuel is made to contain the correct concentration of desirable hydrocarbons in the proper distribution, which give it the highest qualities as any engine fuel so far produced. It contains isopentane, which contributes to proper vaporization of the fuel, isohexanes, isoheptanes and isooctanes.

The nearly pure aromatic compounds are, for the most part, benzene, toluene, and xylene. Only very small amounts of normal paraffins and other compounds of poor quality as engine fuels remain in this type of aviation fuel. Military secrecy prevents divulging of the high yields and ratings of this fuel, without blending in any outside materials.

6. Thermofor Catalytic Cracking Process.

The Sun Oil Co. has not neglected the moving catalyst process devised by Socony-Vacuum Oil Co. engineers, with its many new developments. Consideration is being given to the use of this Thermofor or TCC process as it fits into a refinery already well supplied with catalytic units for production of high quality motor fuels. The TCC process, one of the Houdry licensed catalytic processes, was developed by Socony-Vacuum, based on their experience with the Houdry static catalyst process and their thermofor clay regeneration kiln. The catalyst moves continuously through the cracking zone. The reactor operates continuously on cracking and the spent purged catalyst is transferred to a thermofor kiln, regenerated and returned to the reactor. Otherwise, this process embodies the basic features of the Houdry catalytic process. It was described in a paper presented at the A.P.I. in November, 1942[2].

7. Houdry Catalytic Dehydrogenation Process for the Manufacture of Butadiene.

Research and development work continues in the Houdry laboratories and in the semi-commercial butadiene plant in this refinery, which has been now in operation for about 7 months. This process also applies the principle of utilizing part of the heat produced in the regeneration of the catalyst in a horizontal reactor and operates on short cycles. Equipment and process were described, as far as it is permissible, in NATIONAL PETROLEUM NEWS and other technical magazines.[3] A 15,000 ton per year unit is nearing completion at one of the Sun Oil Co.'s refineries.

Part of the Houdry laboratories is devoted entirely to the development of synthetic rubber intermediates and new polymerization methods. Results so far obtained afford reason to expect that desirable properties now lacking to a certain degree in synthetic rubbers, such as uniformity of production, high tensile strength, elasticity, elongation, and low heat build up, will be greatly improved in the near future. Also that the reaction time for the polymerization of rubber from butadiene and styrene could be decreased to a small fraction of the presently required period.

Another process now being worked out here is the adaptation of the Houdry catalytic process to the manufacture of ethyl-benzene and its dehydrogenation to styrene, needed for the polymerization of butadiene to Buna S rubber. This will enable refiners to manufacture synthetic rubber in one plant, instead of shipping these two main components of synthetic rubber from different points of production to the polymerization plants.

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[2]See References. [3]See References.

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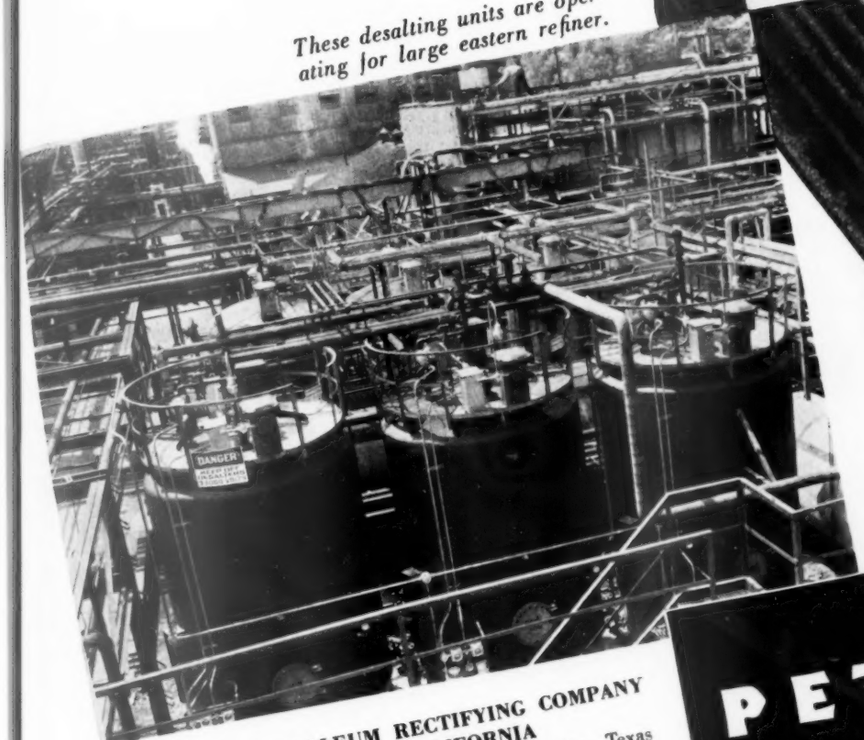

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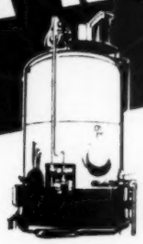

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Reclaiming Alloy Still Tubes

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Method Developed in Refinery Shop for Preheating, Welding New Tips on 4-6% Chromium Tubes, and Annealing in Homemade Furnace

Two annealing furnaces made in the shops of Borger, Texas, refinery of Phillips Petroleum Co., with still tubes in place for welding and annealing. Furnace on the right is open

THE scarcity of chromium alloy steel resulting from wartime demands has stimulated development by refining companies of a welding technique for salvaging alloy still tubes for reuse in furnaces. Companies which are following this practice claim large savings over the cost of new tubes and also avoidance of delays in securing new ones. Welding authorities state the reclaiming of tubes of up to 6% chromium alloy content is practicable.

An important part of the reclaiming technique is the annealing of the tubes after they have been re-tipped by welding. This is because the alloy steel is air-hardening; that is, it will cool sufficiently in the open air from the temperatures reached in welding to freeze serious stresses in the metal and embrittle the otherwise sound metal adjacent to the weld. The tube, if improperly annealed, may fail under service conditions.

Some oil companies are welding the tubes in their own shops and then shipping them to steel plants with facilities for stress-relieving and annealing them to a definite Brinell hardness. Phillips Petroleum Co., at its Borger, Tex., refinery has developed a method for reclaiming 4-6% chromium still tubes which includes preheating, welding and annealing in an annealing furnace made in the company shops. By this practice a $20,925 saving is claimed on 312 tubes salvaged in a year. This refinery's method of reclaiming still tubes is described in the following portion of this article:

Experimental work was first begun in April, 1940, when the Borger refinery decided something had to be done with an accumulation of more than two hundred used 4-6% chromium, 5% molybdenum 4 x 5 in. furnace tubes, according to a report by L. V. Hile, welding foreman. These tubes ranged in length from 26 to 29 ft. and preliminary metallurgical tests indicated they could be reclaimed through arc welding.

Since the tubes were from different stills, and more than one wall thickness and damage condition existed, it was necessary to develop some

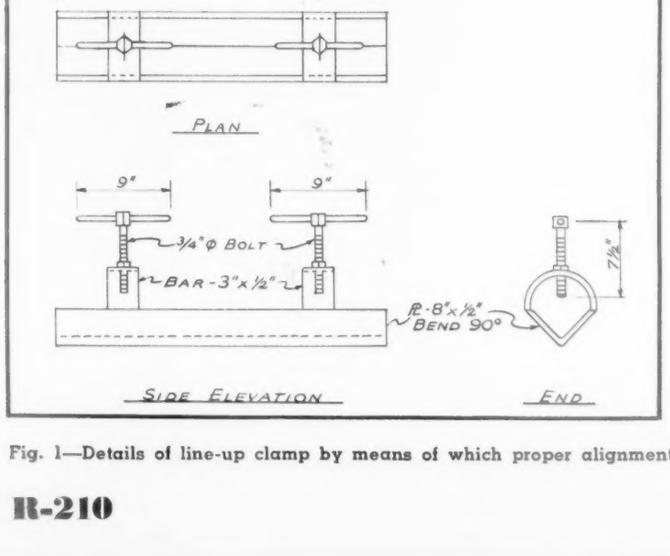


Fig. 1—Details of line-up clamp by means of which proper alignment and 1/8 in. spacing of tube and tip is obtained preparatory to welding

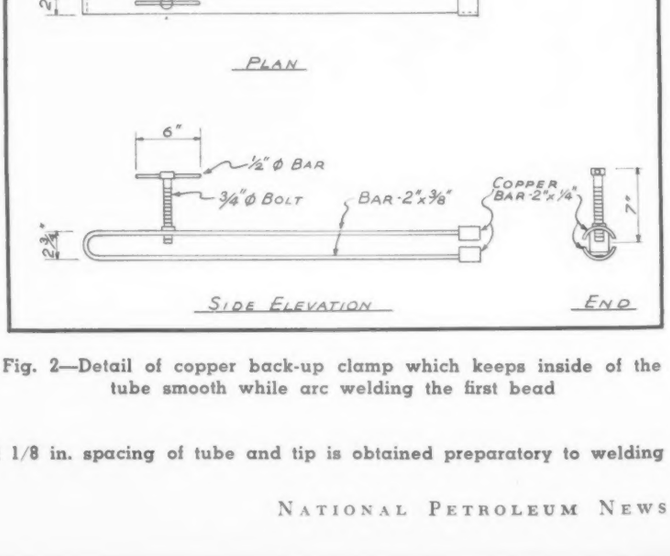


Fig. 2—Detail of copper back-up clamp which keeps inside of the tube smooth while arc welding the first bead

sort of a rating or grading system which would specify the use to which the reclaimed tubes could be put. Accordingly, the inspection department rated the tubes by condition as No. 2, No. 3 and No. 4. The No. 2 and No. 3 tubes were to be used in cracking stills at pressures of about 800 lbs. per sq. in. while No. 4 tubes were to be used in reboiler furnaces at pressures of 300 p.s.i. Most of the damage, corrosion and erosion, was at each end of the tube, so this portion could be cut away and scrapped.

Details of grading were worked out as shown in Table 1. Tubes were calipered and marked by the inspector for cutting and beveling.

Special Jigs Necessary

For successful results, special jigs were developed. These include alignment clamps, thermocouple and stand and back-up ring, all easily fabricated in a refinery shop.

The present design of the line-up clamp, Fig. 1, is made from flattened steel plate, ½ in. thick, 16 in. wide, and 2 ft. 8 in. long, bent in the middle to form a 90° angle, the sides of which are 8 in. wide. Two pieces of bar stock 3 in. wide and ½ in. thick are formed into a semicircle, the ends of which are welded to the sides of the angle. A ½ in. bolt, 7½ in. long and with 9 in. rods for handles, is threaded through the center of the semicircle thus formed. The clamps are welded to the angle so that the center of the bolt is 6½ in. from the end of the angle.

A copper back-up ring, Fig. 2, is used to insure that the inside of the tube is kept smooth while welding the first bead. This back-up ring is made from a bar 2 in. wide, ⅜ in. thick and 6 ft. 6¾ in. long. It is formed into a "U", the legs of which are 3 ft. 2 in. long and 2¾ in. from each other, outside measurement. Two approximately semicircular strips, made from 2 in. by ¼ in. copper bar, are welded one to each leg of the "U" on the outside. A ¾ in. bolt 7 in. long, provided with a 6 in. by ½ in. bar for a handle, is threaded through one of the legs 8 in. from the bend of the "U". This permits fitting the copper semicircles snugly to the inside of the pipe.

The thermocouple stand, Fig. 3, is fabricated from a 1-in. pipe welded to a flat steel plate 12 in. wide and ¼ in. thick. The pipe is 1 ft. long, and drilled to take a ⅜ in. adjustment bolt provided with a bar handle 2½ in. by ⅜ in. Fitting inside the pipe is a clamp made from ¾ in. bar stock, split and curved as shown and taking a ½ in. bolt. This last holds the thermocouple and protective tube in proper horizontal adjustment, while the stand bolt permits proper vertical positioning.

The annealing oven also is easily constructed in any refinery shop. It is built from the two halves of a 24 in. O.D. pipe 2 ft. long, insulated with 3 in. of "insulcrete" lining. (*See Fig.* 4). Semicircular steel plates having a semicircular hole to take the furnace tube itself are welded in at each end, and to the two lower of these are attached used bearings or wheels to support the pipe and permit turning for welding. A 2-in. hole is provided to

Table 1—Tube Grading Details

No. 2 Condition

Minimum wall thickness, ins.	0.48 to 0.59
Maximum wall thickness, ins.	0.62
Outside diameter of tube, ins.	5
Length of tube, ft.	26, 27, 28, 29
Detail of tube preparation	Chamfer both ends of 26 and 27 ft. and weld ⅝ in. wall thickness tip on each end (2 ft. and 1 ft. L.G. respectively). Cut ends of the 28 and 29 ft. tubes per marking below, weld ⅝ in. wall tubing to make 30 ft. furnace tubes.

No. 3 Condition

Minimum wall thickness, ins.	0.39 to 0.47
Maximum wall thickness, ins.	0.62
Outside diameter of tube, ins.	5
Length of tube, ft.	26, 27, 28
Detail of tube preparation	Chamfer both ends of these tubes and weld ½ in. wall tip on each end to make 30 ft. furnace tubes.

No. 4 Condition

Minimum wall thickness, ins.	0.31 to 0.38
Maximum wall thickness, ins.	0.62
Outside diameter of tube, ins.	5
Length of tube, ft.	26, 27, 28
Detail of tube preparation	Chamfer both ends of these tubes and weld ½ in. wall tip to make 30 ft. furnace tubes.

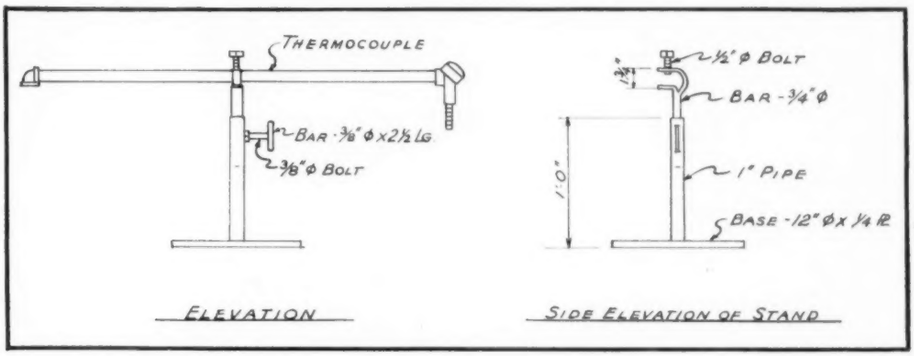
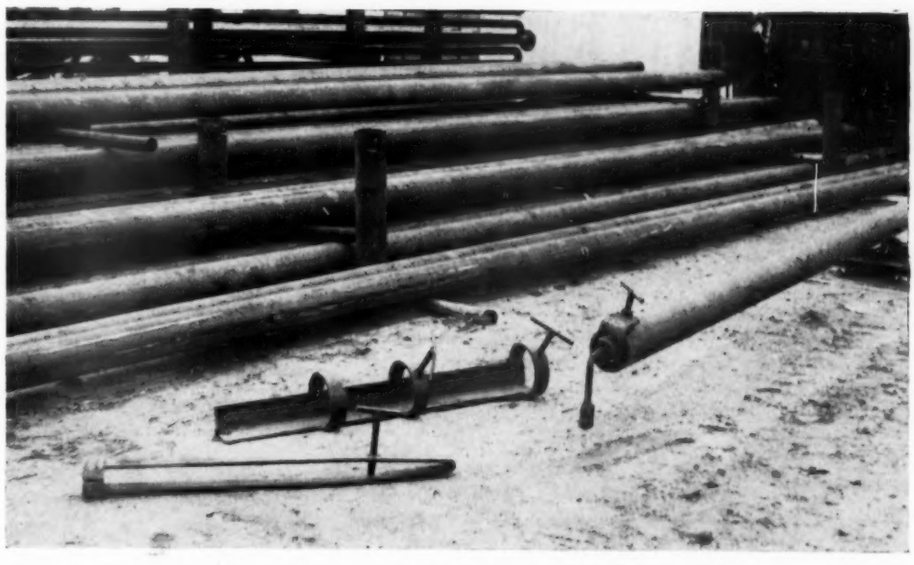


Fig. 3—Details of thermocouple and stand



On the ground in the foreground are the back-up clamp and line-up clamp used in welding new tips on still tubes. In the end of the tube is clamp for ground wire

take the 2-in. diameter burner nozzle. The burner is made from 2-in. pipe attached to a mixing chamber by a 2-in. coupling. The burner head or mixing chamber is built from a 4 in. by 2 in. swage, with suitable ports for air and gas. The top half of the furnace is provided with a 4 in. pipe to act as a flue, and two handles made from bar stock are attached for convenient lifting hand-holds. The halves are joined by a homemade hinge.

Welding Procedure

The procedure, described here for No. 2 condition tubes, provides for a preheat time of 15 minutes at 600-650° F. and a welding time of 30 minutes, followed by annealing.

Both tube and tip are placed loose in the furnace, thermocouple installed in the tip close to the point to be welded; furnace is closed and heat brought up to 600° F. in 15 minutes. Furnace then is opened, thermocouple removed, line-up clamp installed to provide a ⅛ in. opening between tube and tip, and copper back-up ring installed. Tackwelds are made at 3 points equidistant from each other around the tube circumference. Tacks are thoroughly cleaned and line-up clamp removed. First bead is deposited with ⅛ in. 4-6% chrome welding rod, followed by thorough cleaning, removal of both line-up clamp and copper back-up ring, and reinstallation of thermocouple. Welding operation then is continued.

No. 2 condition tubes require 4 more beads with 5/32-in. rod for completion. Thermocouple readings will show a drop of about 100° F. from initial preheat while welding the first bead, but tube temperature will increase to 700-750° by time weld is completed. It is necessary to "crack" the fire under the tube while welding proceeds to prevent additional temperature drop; the operator is protected by asbestos paper thrown across the fire in front of him.

Annealing Procedure

Following completion of welding, the top of the furnace is lowered to enclose the tube; tube heat being brought to 1370° F. to stay on safe side of the 1425° F. critical temperature, and maintained at that point (straight line on recording pyrometer) for 30 minutes. After the high-heat period is completed, tube is allowed to cool at a uniform rate to 900° for 30 minutes. When the weld is cool enough, it is stenciled with welder's stencil and a heat number; the pyrometer chart is similarly marked and filed for reference. One tube out of 25 is Brinell tested as a check on the work; the Brinell hardness number should run between 170 to 180, but it is considered safe if the number runs to as high as 200.

Cost of Re-tipping

At first glance, average cost of retipping would seem excessive—$12.86 for a No. 2 condition tube and $25.72 for Nos. 3 and 4 condition tubes (two tips each). However, this is more than balanced by the dual savings which result. The actual monetary savings per tube ranges from $62.88 where two tips are welded to $79.64 where one tip is welded, according to Phillips' figures, based on new tubes costing $137.28. The fact that these tubes are difficult to secure while deliveries generally may be extremely delayed, makes for a distinct saving in time as well. Table 2 is an analysis of cost of welding based on one tip. Table 3 is a comparison of cost of reclaiming by welding with cost of new tubes based on 1941 figures.

Providing 2 furnaces are available, time may be gained by having tip and tube lined up and the new tube started on preheat time, while the welded tube is on the last 15 minutes of reducing temperature.

Fig. 4—View of annealing furnace opened. It was made from two halves of a 24-in. pipe cut 2 ft. long. Angle iron pedestals were welded on the bottom section and set in concrete. It is lined with 3 ins. of insulating material. Pipe showing at left of furnace is 4-in. pipe stack to remove fumes. In right hand corner is shown the gas burner which feeds the furnace. In the background are strip chart potentiometers for this and another similar furnace

Table 2—Welding Cost

(Based on One 1 Ft. Tip)

Labor (1941 wage scale)	
Welder's time, 2¼ hrs.	$ 2.68
Helper's time, 2¼ hrs.	1.98
Inspector's time	0.50
Pipe machine operator's time	0.50
Lathe operator's time for cutting, beveling and reaming tip	2.25
Total—Labor	$ 7.91
Material	
1 ft., 5 x 4 m. tip	$ 4.58
1 lb. 4-6% chromium welding rod	0.35
Electricity	0.02
Total—Material	$ 4.95
Total welding cost, per tip	$12.86

Table 3—Comparison Retipping Cost with Cost of New Tube

(Based on 1941 Values)

Retipping No. 2 Condition Tube (1 tip)

Cost of new tube		$137.28	
Less:			
Depreciation, reclaimed tube	$37.28		
Retipping cost	12.86		
Junk value	7.50	57.64	
Net saving, per tube		$ 79.64	
78 tubes, reclaimed @ $79.64 each			$6,211.92

Retipping Nos. 3 and 4 Condition Tubes (2 tips)

Cost of new tube		$137.28	
Less:			
Depreciation, reclaimed tube	$41.18		
Retipping cost	25.72		
Junk value	7.50	74.40	
234 tubes, reclaimed @ $62.88 each		$ 62.88	$14,713.92
Total net savings, 312 tubes			$20,925.84

ABC OF CHEMICAL DERIVATIVES FROM PETROLEUM

VI. Aviation Gasoline and Basic Hydrocarbon Fractions

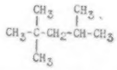
By R. L. WAKEMAN[1] and B. H. WEIL[2]

"For I dipt into the future, far as human eye could see,
Saw the vision of the world, and all the wonder that would be;
Saw the heavens fill with commerce, argosies of magic sails,
Pilots of the purple twilight, dipping down with costly bales;
Heard the heavens fill with shouting, and there rained a ghastly dew
From the nations' airy navies grappling in the central blue;
Far along the world-wide whisper of the south wind rushing warm,
With the standards of the peoples plunging thro' the thunderstorm;
Till the war drums throbb'd no longer, and the battle flags were furl'd
In the Parliament of man, the Federation of the world"

—Tennyson in "Locksley Hall," 1842.

WHETHER in the thick of battle or in the lanes of peaceful commerce, the dexterity of our "pilots of the purple twilight" bespeaks supreme confidence in American-built planes and in American-made fuel.

The history of aviation gasoline is a saga of American inventive genius. The earliest airplanes burned gasoline which differed hardly a whit from that consumed by automobiles of the same era. Lindbergh's *Spirit of St. Louis* used a fuel of only 60-octane number. During the late 'twenties, engineers began to grasp the basic relationships behind engine knock,[3] compression ratio,[4] and fuel composition. Then came the 'thirties, rife with chemical and engineering accomplishments. Standards known as octane numbers were set up by which chemists and engineers could measure their work. They found that a hydrocarbon called isooctane,

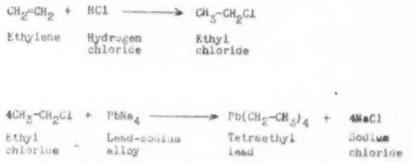


was an excellent motor fuel, while normal heptane, $CH_3—CH_2—CH_2—CH_2—CH_2—CH_2—CH_3$, knocked horribly. Assigning the latter a value of 0 and the former a value of 100, they could compare other gasolines with known mixtures of these two compounds and determine quantitatively the value of unknown fuels. Thus a gasoline which gave the same knocking characteristic as a mixture of 70% isooctane and 30% normal heptane was said to have an "octane number" of 70.

Next, researchists found that certain chemicals such as benzol and "Ethyl fluid", added in small quantities, caused miracles. Poor fuels became acceptable; good ones became excellent; excellent fuels were transformed into mixtures which surpassed the needs of engines of that day. "Ethyl fluid" was especially effective. It was found that 4 parts in 10,000 parts of fuel could retard knock as effectively as 2500 parts of benzene.

"Ethyl Fluid"

"Ethyl fluid" was the result of trial-and-error experimentation; even to this day no satisfactory theory for its action is known. Its basic constituent is tetraethyl lead, $Pb(C_2H_5)_4$, a chemical now produced chiefly from ethylene from cracked gases:



Much of the hydrogen normally used in producing the necessary hydrogen chloride is also obtained from natural gases, such as by use of the methane-steam reaction described in a previous article. The other chief constituent of "Ethyl fluid" is ethylene dibromide, $BrH_2C—CH_2Br$, made from petroleum ethylene and bromine from sea water. Minor constituents are ethylene dichloride, kerosine, bromonaphthalene, and a red dye.

Polymerization and Hydrogenation

At this point, the petroleum research chemist reasoned that if isooctane was such a good fuel, why not see if some inexpensive way could be found to produce it—to lower its price far below $30.00 a gallon. The synthesis of tertiary butyl alcohol, already a commercial

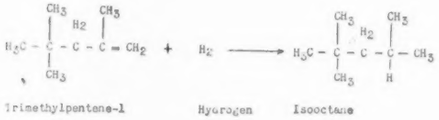
[1]Pittsburgh Equitable Meter Co.'s Industrial Fellowship, Mellon Institute, Pittsburgh.
[2]Chemistry Division, Gulf Research & Development Co., Pittsburgh.

[3]Premature explosion of air-fuel mixture before the point where maximum power can be delivered, causing power loss, excessive temperatures, and high-pitched sounds.

[4]The ratio of cylinder volume above a piston at its lowest point of travel to the volume above the piston at its highest point of travel.

reality, required reaction of isobutylene, $CH_2=C(CH_3)_2$, with sulfuric acid. It was demonstrated that during this reaction small amounts of dimers unavoidably were formed and that these dimers could be hydrogenated to yield isooctane. That clue was all the chemist needed to develop the "cold-acid" process, and in 1935 isooctane came out of the laboratory into the world of commerce.

The synthesis of isooctane in this manner makes use of two basic hydrocarbon reactions as tools—*polymerization* and *hydrogenation*. Polymerization, as described in the first article of this series,[5] results where two or more unsaturated molecules add to each other to form a larger molecule. In the case of isobutylene, reaction may continue indefinitely to form long-chain polymers, such as "Vistanex," or it may be cut short to form dimers, as in the case of isooctene. Catalysts and conditions of temperature and pressure determine the course of reaction. Hydrogenation involves addition of hydrogen to adjacent atoms of carbon joined by a multiple bond; two atoms (a molecule) of hydrogen serve to transform a double bond into a single one:



These reactions were tried with other olefins, for it seemed that their dimers should also have high octane numbers. It soon was found that cold sulfuric acid would dimerize isobutylene only, but that hot sulfuric acid would cause this olefin to react with the normal butylenes also, yielding codimers which, upon hydrogenation, gave a mixture of branched-chain hydrocarbons of 92-98 octane number. While the product is thus slightly inferior in quality to isooctane, yields are roughly twice as great. Going further, the chemist polymerized mixtures of butylenes and propylene, getting still higher yields of high-octane polymers upon hydrogenation. Solid phosphoric acid-bearing catalysts could be used as well as sulfuric acid. These reactions are summarized in Fig. 1.

[5] National Petroleum News, Technical Section, 34, R-412 (1942).

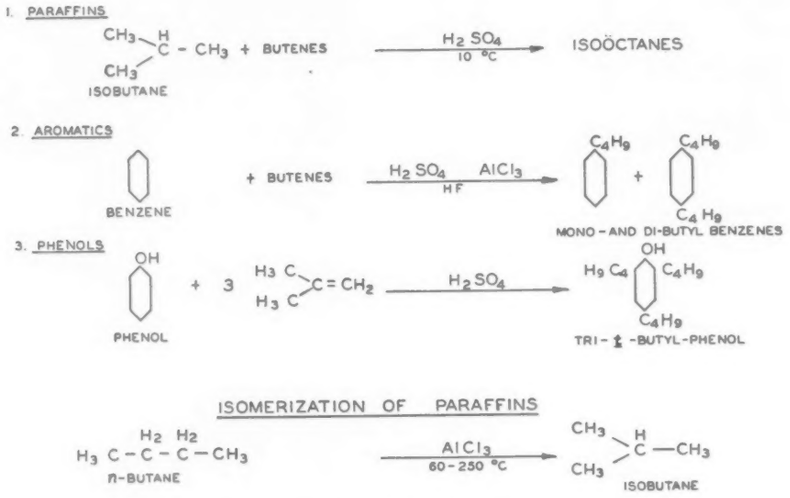


Fig. 2—Typical alkylation and isomerization reactions

It is a fortunate peculiarity of the molecular engineer that, when he gets one good method for making something he wants, he does not close his eyes, fold his hands, and let well enough alone. Scarcely three years passed after isooctane became a commercial reality before an entirely new method was developed for its production, namely, *alkylation*.

Alkylation

Alkylation is the process wherein an alkyl radical (such as methyl, isopropyl, isobutyl, etc.) is introduced into an organic compound by substitution or addition. Typical reactions are shown in Fig. 2. The chemist had long known certain reactions of this general type, but his interest had centered chiefly in introducing alkyl radicals into aromatic compounds; aliphatic compounds were considered too inactive. Now, however, he tried the reaction between isobutane, $CH_3—CH(CH_3)—CH_3$, and a mixture of the butylenes in the presence of concentrated sulfuric acid at 90° to 120° F. Thus, in one step, and in much greater yield, he obtained a mixture of isooctanes nearly as high in antiknock value as hot-acid polymer.

In the space of only a few years, therefore, the petroleum industry had discovered two excellent methods for producing commercially a fuel better than any ever known. Demand for 100-octane gasolines climbed rapidly and then, as a result of World War II, soared to undreamed-of levels. New companies entered the field, some with new processes. One major producer in 1939 announced a method of alkylating isobutane with ethylene to yield neohexane, a blending agent of 94-octane value. Isobutane thus had two aviation gasoline uses and, when war came, supply began to fall behind demand.

Isomerization and Dehydrogenation

Until only a few months ago isobutane was derived completely from the butane-butene hydrocarbon fraction of refinery gases and natural gas. It exists therein as the lesser of the two butanes; normal butane, $CH_3—CH_2—CH_2—CH_3$, being by far the major constituent. These two substances are isomers.[6] Here appeared to be a chance to use another basic hydrocarbon tool—*isomerization* or molecular rearrangement. It was not long before several processes to effect this isomerization appeared, typical of which is the reaction shown in Fig. 2. Isomerization plants today are going up in large numbers to alleviate the shortage of isobutane.

Similarly, the aviation gasoline industry soon encountered a shortage of butylenes, at first obtained from cracked refinery gases. Supplies from this source becoming insufficient, despite increased potential output from new catalytic

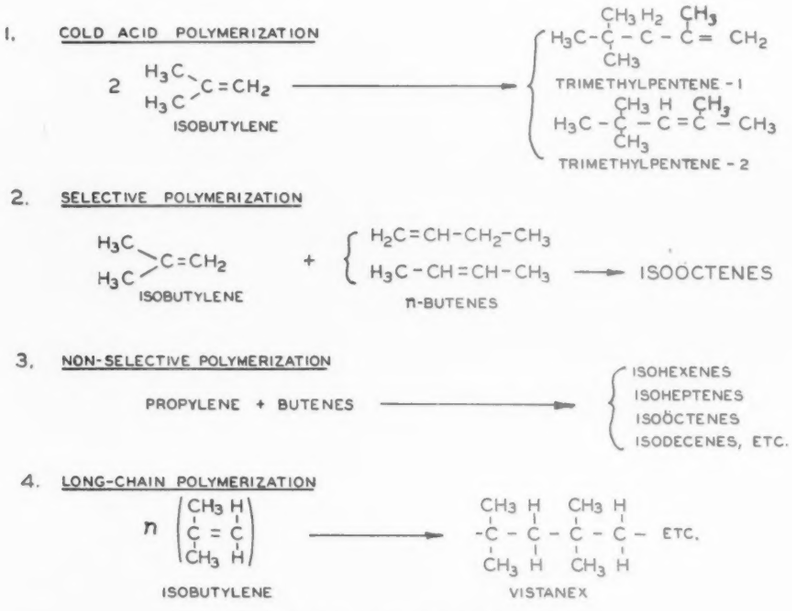


Fig. 1—Olefin polymerization

[6] A term applied to two chemicals having identical percentage compositions of the same elements but differing in molecular arrangement, hence in properties and identity.

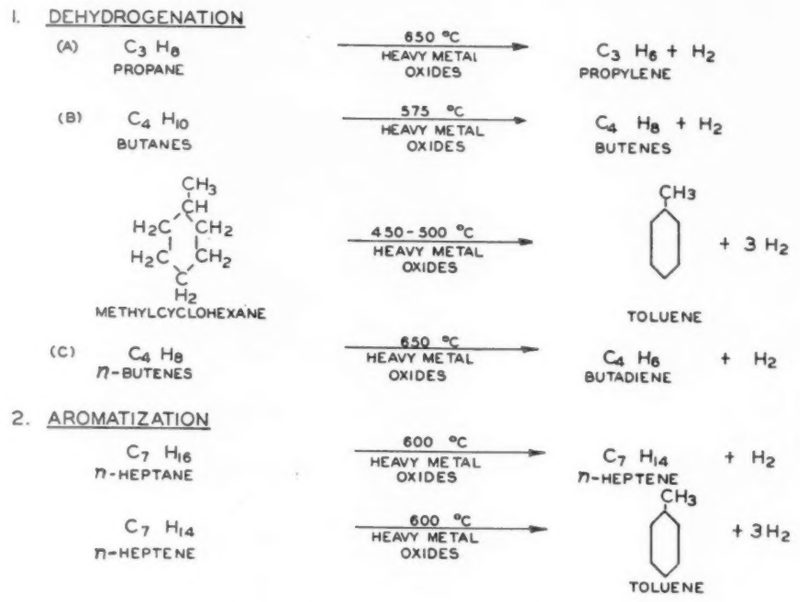
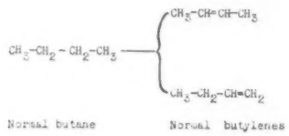


Fig. 3—Thermal-catalytic reactions

cracking plants, the petroleum chemist called upon the process of *dehydrogenation*—the removal of hydrogen from adjacent carbon atoms of an organic compound, with resultant introduction of a multiple bond. Again using the plentiful normal butane, he catalytically produced butylenes in the following manner:

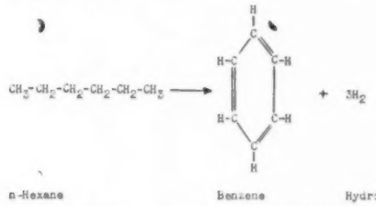


This reaction has become of even more importance with the advent of the synthetic rubber program, which likewise requires huge quantities of butylenes for butadiene production. Typical dehydrogenation reactions are set forth in Fig. 3.

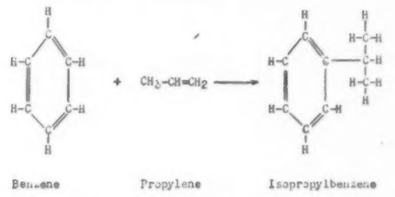
Aromatization

Petroleum chemists had learned some basic lessons while these developments were occurring. They noted qualitative relationships between molecular structure and octane number—the fact that in general a higher degree of branching of the carbon-chain meant a higher octane number. They paid attention again to the high-octane properties of aromatic compounds, especially alkylated compounds. Through research spurred by the wartime need for getting planes into the air quickly, they became cognizant of "rich-mixture agents", compounds which could give the desired "lift" to aviation fuels. Cumene—isopropylbenzene was found to be highly desirable. Almost overnight benzene became scarce—a double problem, because synthetic rubber also requires benzene for styrene. Synthesis or extraction from petroleum seems the answer—an answer for which petroleum chemistry is ready, if needed, with the basic process of *aromatization*, the turning of a paraffin into an aromatic hydrocarbon (see Fig. 3).

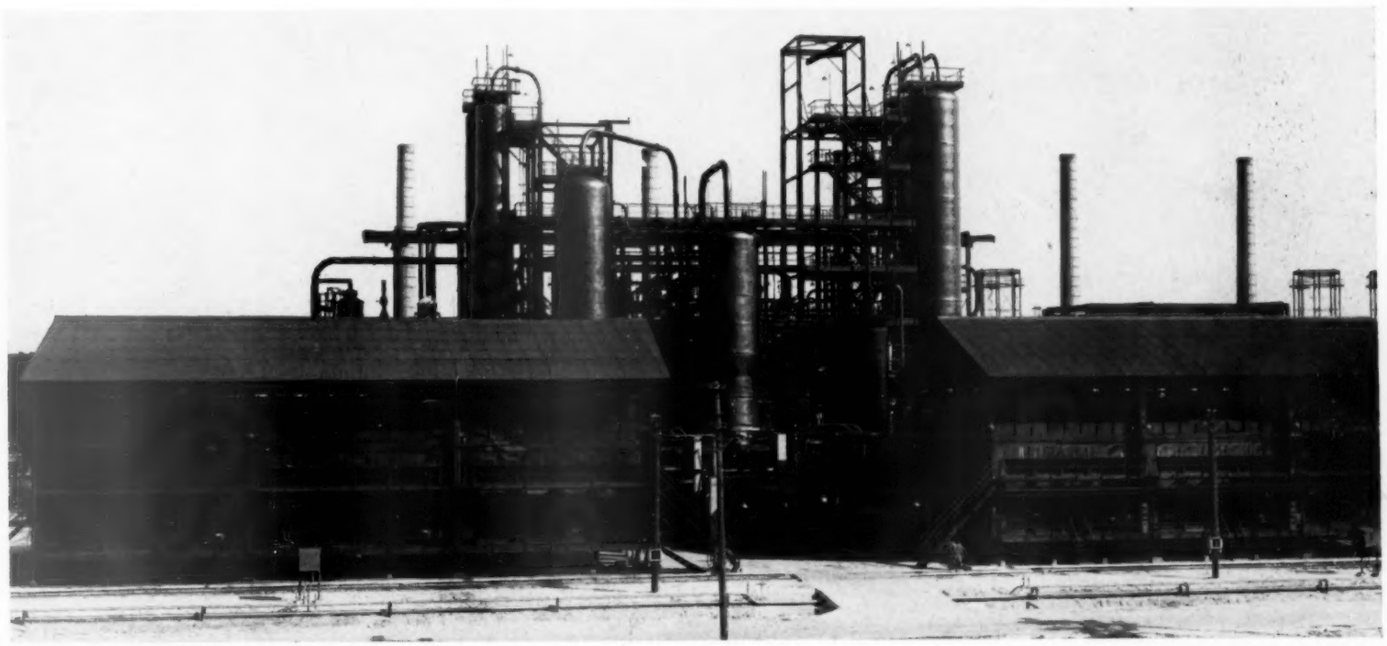
The petroleum industry already has stepped into the breach with a similar process for the preparation of toluene for TNT. If desired, it can now cyclize hexane to benzene also:



Benzene so produced—or obtained by extraction from aromatic distillates manufactured by modern refining processes, such as hydroforming—can then be alkylated with propylene from cracked gases to yield cumene:



Other blending agents have also been discovered, but their identities cannot be revealed until after the war. Likewise, other processes have been developed for producing



A view of the polyform unit at a Gulf Oil Corp. refinery in Texas. The two buildings in the foreground house heating furnaces. The polyform process utilizes gases previously wasted and combines these with a wide variety of stocks to yield distillates of high octane number and aromatic content

Isooctane

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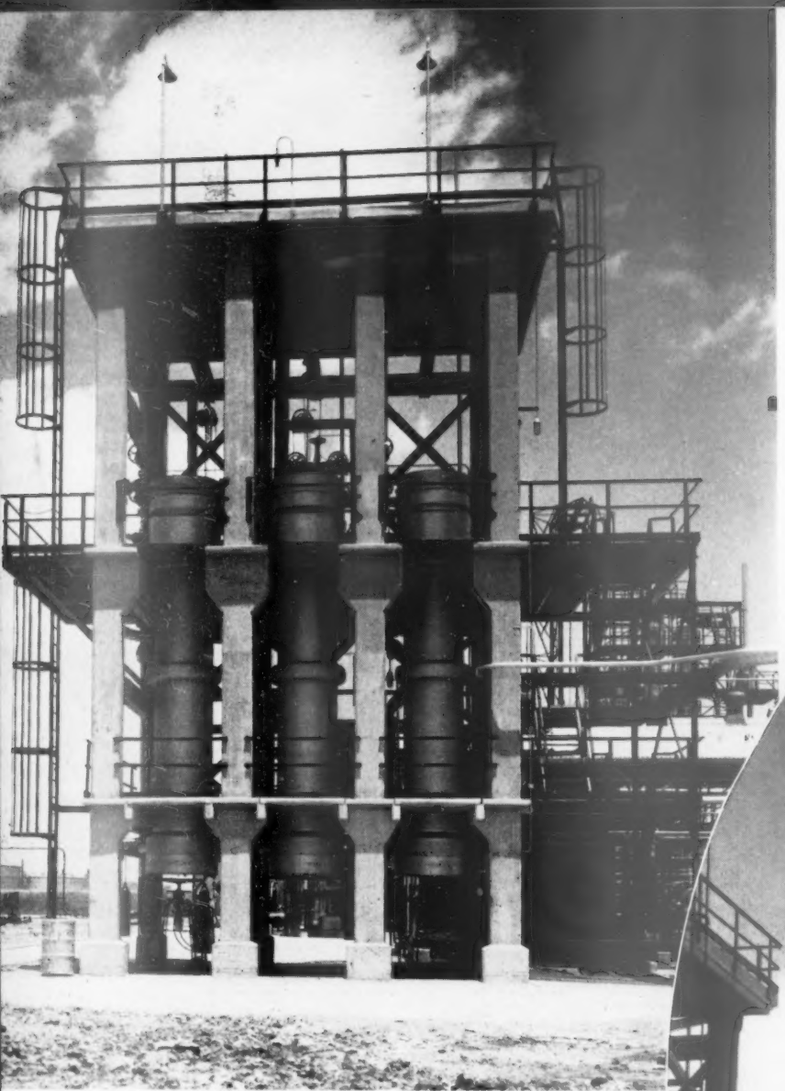
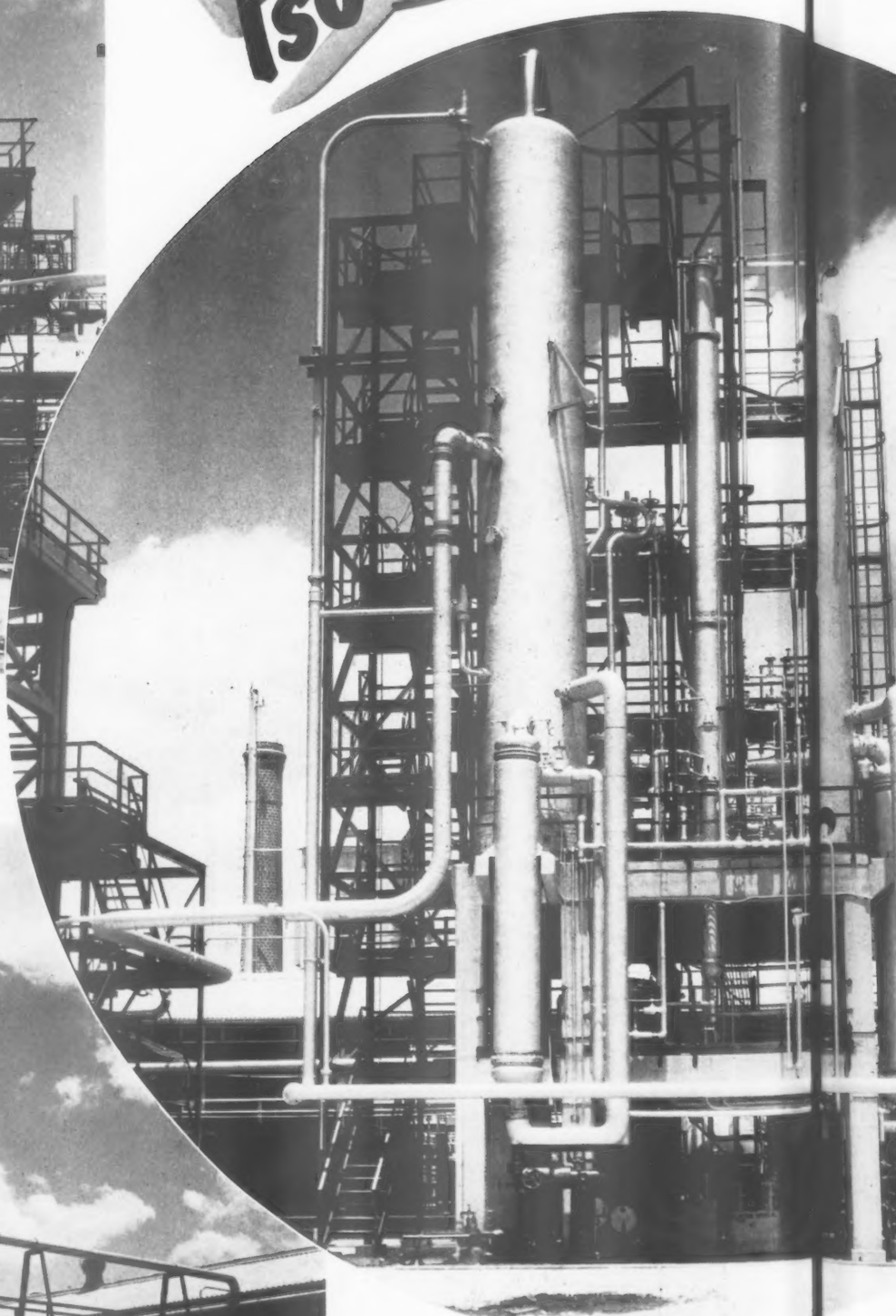


In these high-pressure reactors, in the 100-octane plant of Gulf Oil Corp., the butylenes are polymerized to liquid products. This process, which uses a solid phosphoric acid catalyst produces a slightly lower volume of finished product than by cold sulfuric acid method but of higher octane rating



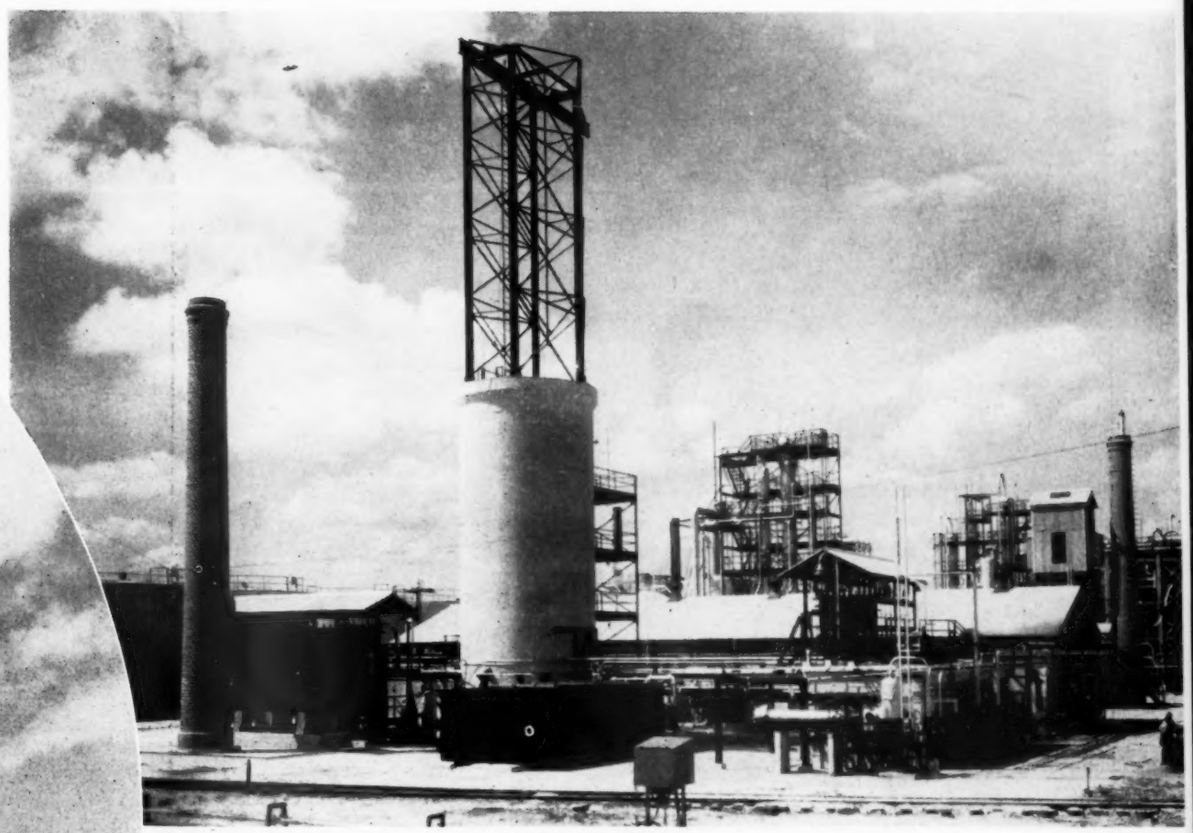
Fractionating towers, in the polymerization u of the Gu Corp.'s 100-octane plant in Texas, for purification tylene pol

In this decalorator, heat generated by polymerization of butylenes is removed and the gaseous materials are reduced to a liquid state. Capacity of this plant is equivalent to 120 tons of melting ice

Butylenes for th oduction o 100 octane blen agents are segregated fro er gases. spherical shap tanks here was ado for their age because it ws use o imum weight el for bu

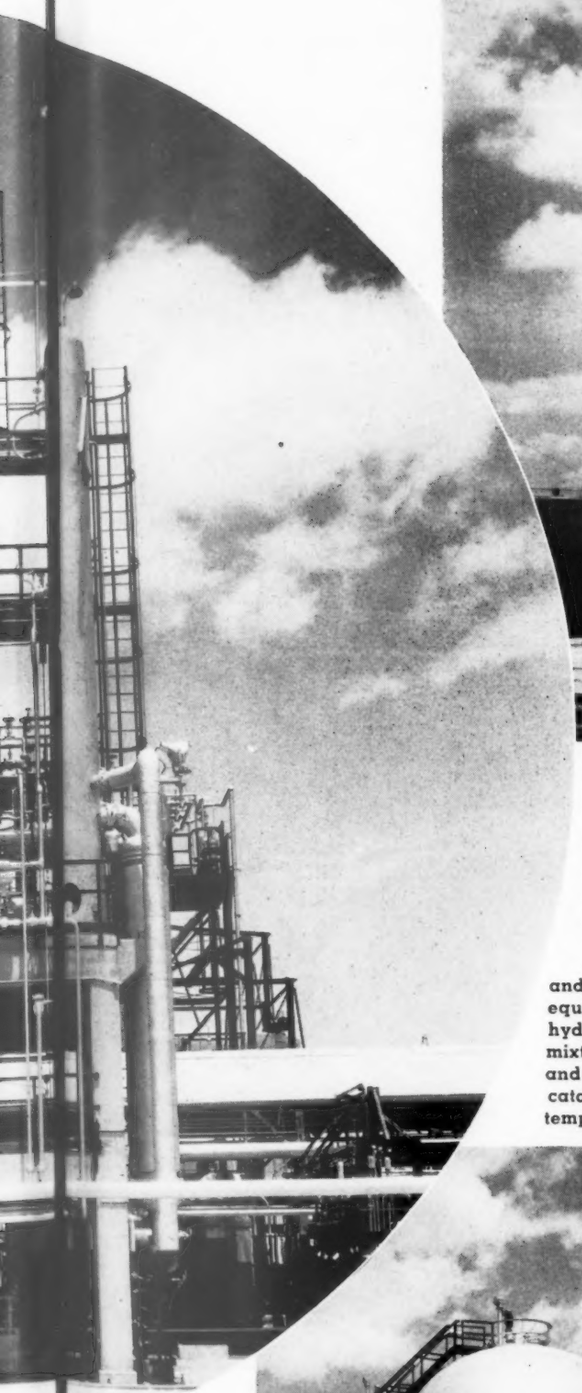
OR VIATION GASOLINE BY POLYMERIZATION AND HYDROGENATION

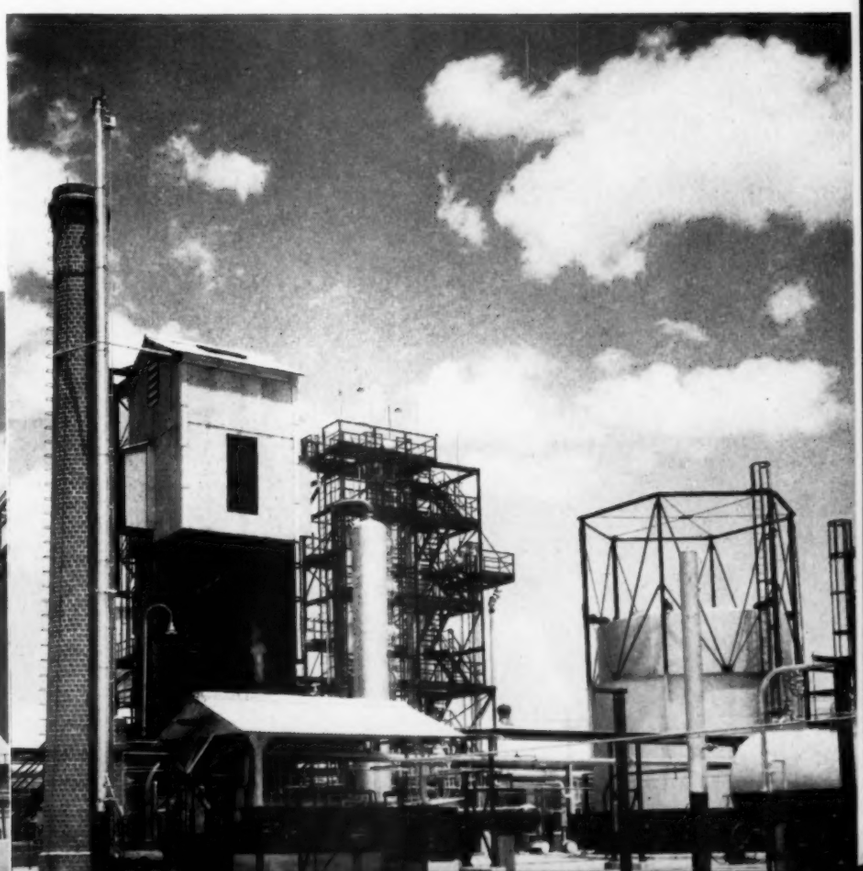
(Photos courtesy Gulf Oil Corp.)

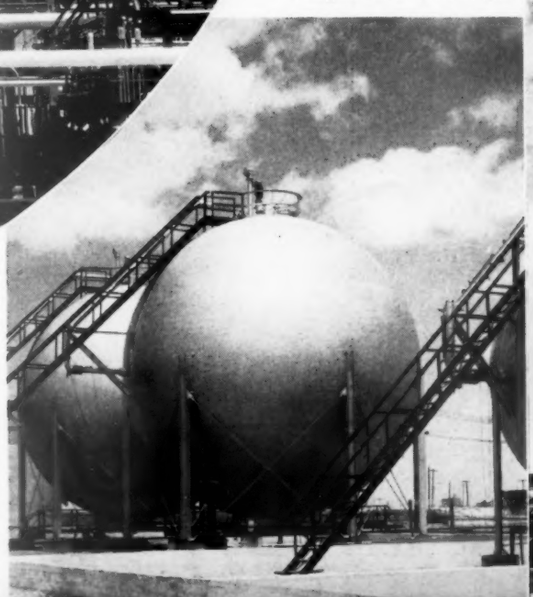


Dimers and codimers produced by polymerization of butylenes while of high octane numbers, must be hydrogenated to isooctanes for commercial use. Located within the reinforced concrete structure shown is a hydrogenation catalyst chamber, more than 40 feet high and capable of withstanding high temperatures and pressures of 3500 pounds per square inch

Hydrogen must be supplied in big quantities for hydrogenation of dimers and codimers. This equipment produces hydrogen by passing a mixture of natural gas and steam through the catalyst beds at high temperature conditions







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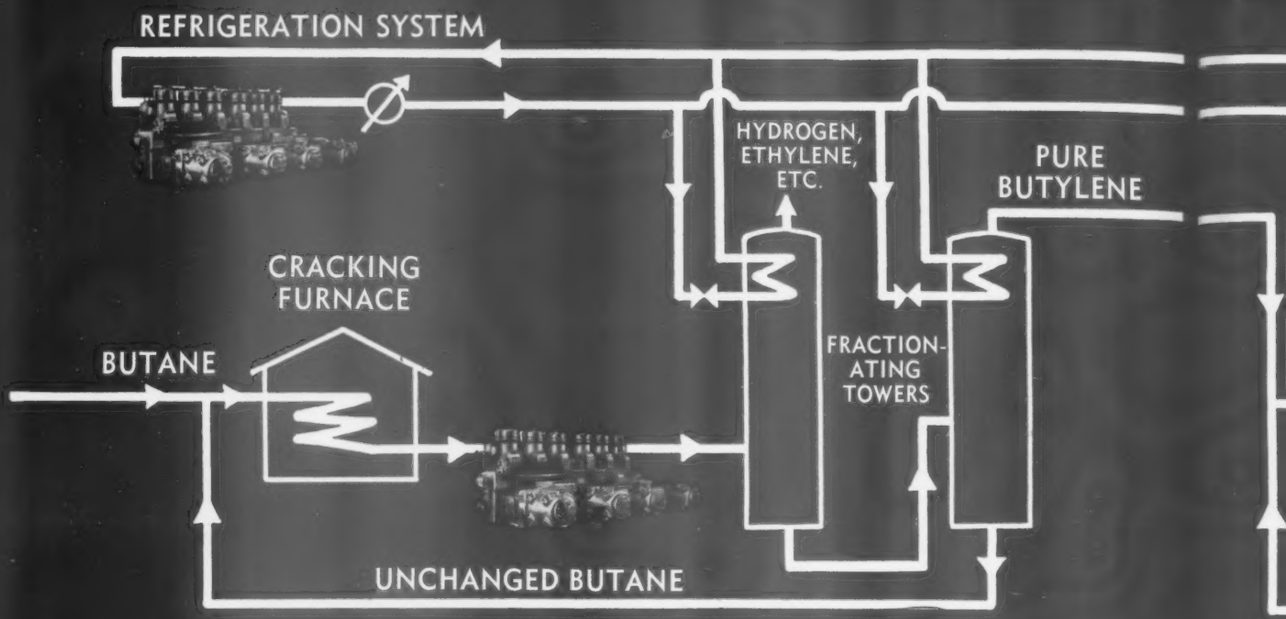
CLARK COMPRESSO



Here two Clark 3,000 H.P. "Angles", steam-driven, are furnishing compressed air to burn coke, tar and asphalt from the catalyst, in a high octane gasoline refinery.

AMONG the scores of processes so far developed in making synthetic rubbers of the various types — one of the heavy volume roles will be that of the manufacture of Butadiene, the petroleum product from which the Buna N and Buna S types of rubber for automobile tires will be produced.

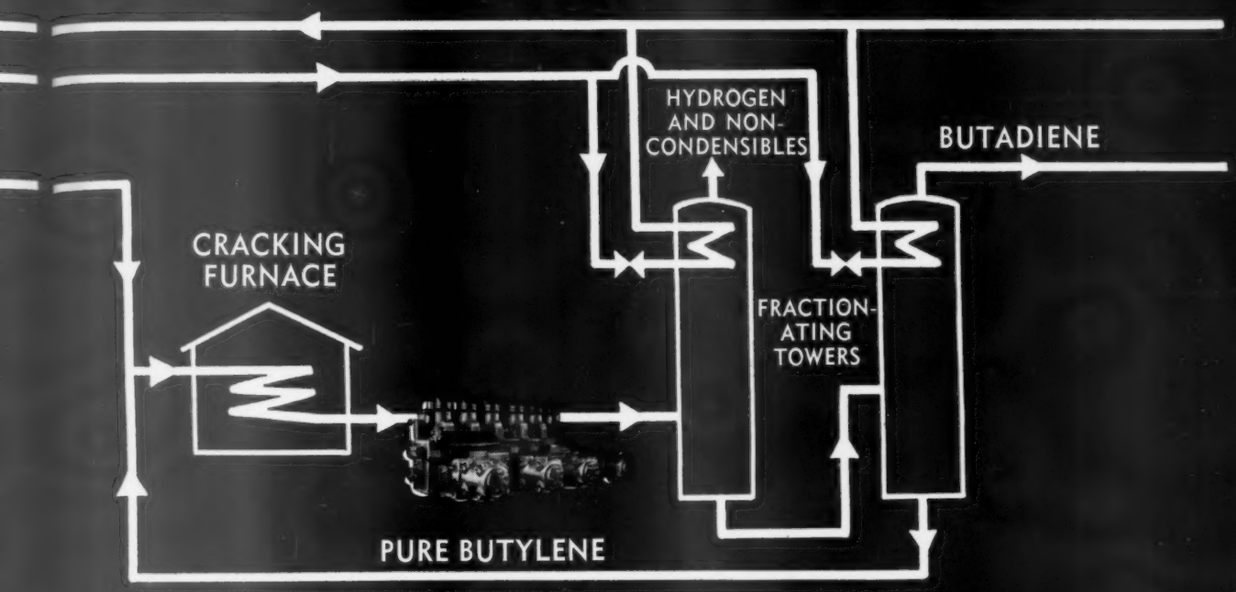
The simplified flow chart shown above indicates the part that CLARK Compressors will play in many leading Butadiene plants. They will be used for compression of gases for charging the fractionating towers and for refrigeration.

These processes are typical of the services that CLARK Compressors are being called on to perform in all types of synthetic rubber plants. In one type of plant CLARK Compressors will produce temperatures in the neighborhood of 150 degrees below zero.

CLARK Compressors are also used in the manufacture of Styrene from petroleum—the

CLA

ORS *for* BUTADIENE



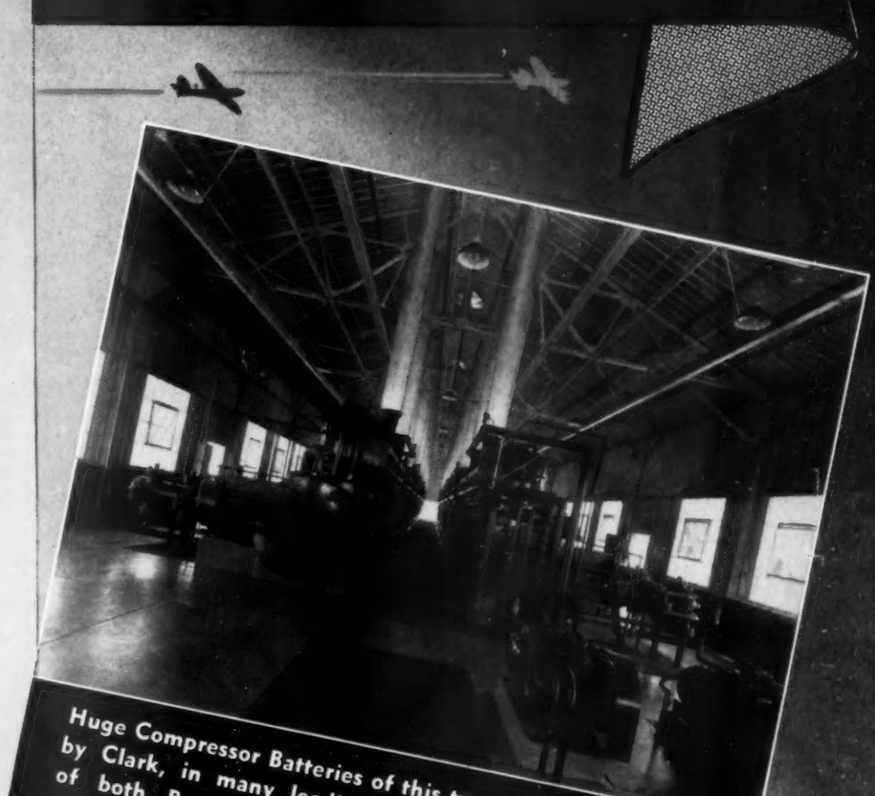
material which is combined with Butadiene to form Buna S Rubber. They are also in tremendous demand for many war industries not connected with rubber. They perform major operations in the manufacture of high octane gasoline, high explosives, synthetic alcohol, synthetic ammonia, and many other chemicals and materials needed for the war production program. Clark engineers have had intimate contact with these war industries from the start and understand their compressor problems. Call them into consultation.

CLARK BROS. CO., INC., Olean, New York

Export Offices: 30 Rockefeller Plaza, New York. Domestic Sales Offices and Warehouses: Tulsa, Okla.; Houston, Texas; Chicago, Ill. (122 S. Michigan Ave.); Boston, Mass. (131 Clarendon St.); Huntington Park, Calif. (5715 Bicket St.) Foreign Offices: 72 Turnmill St., E. C. 1, London; Avda Roque Saenz Pena 832, Buenos Aires.

Affiliated Companies: Dresser Manufacturing Co., Bradford, Pa.; Pacific Pump Works, Huntington Park, Calif.; Bryant Heater Co., Cleveland, Ohio.

ARK



Huge Compressor Batteries of this type are being installed by Clark, in many leading plants for the manufacture of both Buna and Butyl types of synthetic rubber.

1. COMPLETE DECOMPOSITION

$$CH_4 \xrightarrow[\text{BRICK WORK}]{1100\ ^\circ C.} C + 2H_2$$

2. COMBINATION DEMETHANATION – DEHYDROGENATION

(A) C_3H_8 (PROPANE) $\xrightarrow{800\ ^\circ C.}$ C_2H_4 (ETHYLENE) + CH_4 (METHANE)

(B) C_3H_8 (PROPANE) $\xrightarrow{800\ ^\circ C.}$ C_3H_6 (PROPYLENE) + H_2 (HYDROGEN)

3. HIGH-TEMPERATURE CRACKING

CRUDE OIL, GAS OIL, NAPHTHA $\xrightarrow[\text{BRICK WORK}]{1100\ ^\circ C}$ GAS, BUTENES, BUTADIENE, BENZENE – TOLUENE – XYLENES, STYRENE – METHYL STYRENES

Fig. 4—Typical thermal decompositions

those agents already known. Hydrofluoric acid as a catalyst is beginning to replace sulfuric acid in alkylations, for example. Nor has petroleum research in general been at rest. Gas reversion processes, hydroforming, polyforming, catalytic cracking processes—and such new methods as "cycloversion" and the "isomate" process—all have contributed to the aviation gasoline picture. Typical thermal decompositions utilized in many of these operations are shown in Fig. 4.

The 100-Octane Blend

The fighting fuel which the modern plane demands is not a single chemical, nor even a mixture of several chemicals. Today's superfuel, according to *The Lamp*,[1] is believed to be derived in the following proportions from the various processes used for its manufacture:

"Base Stock . . . . . 70% from natural naphthas
20% by catalytic cracking
10% by hydrogenation

Blending Stock . . . 95% by alkylation
5% by (polymerization, then) hydrogenation

Tetraethyl Lead . . . Less than ¼ liquid ounce per gallon."

One-hundred octane fuel is thus a blend of selected straight-run naphthas, catalytic naphthas, hydrogenated polymers, isopentane (sometimes needed for volatility), alkylates, tetraethyl lead, and other "secret" ingredients, such as cumene, all present in varying proportions, depending on the refiner. The finished fuel, too, must be of proper boiling range and volatility and must be low in gum-forming constituents and water solubility.

Base stocks, therefore, are fully as important a consideration as blending stocks and tetraethyl lead which brings the mixture up to 100-octane. The higher the octane blending value of the naphtha and the higher its lead susceptibility, the lower the amount of more-costly blending agent and still more-costly "lead" which need be used. For this reason, natural naphthas are being carefully selected and set aside for aviation gasoline; Houdry, Thermofor, and "fluid" catalytic cracking plants are being built in large numbers; bulk isomerization processes are being developed to improve the naphthas available.

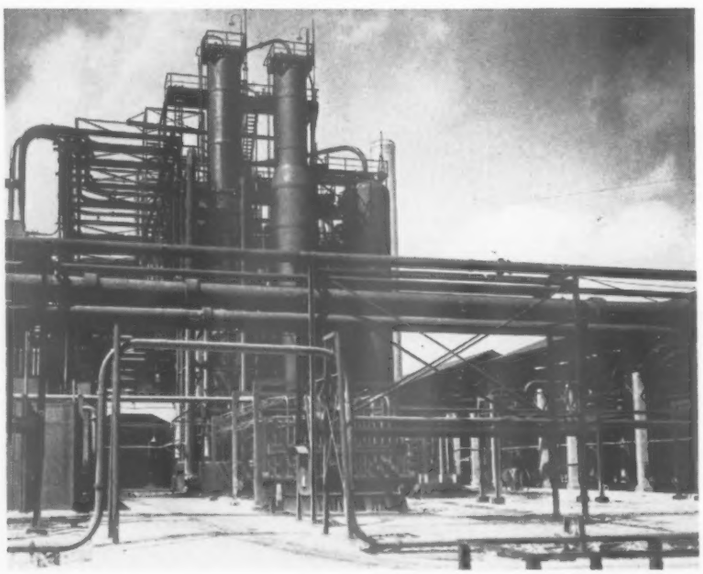
Tetraethyl lead, too, is being husbanded carefully. Because it requires chlorine for its manufacture, and because chloríne is vital for other war programs as well, tetraethyl lead is not being produced to capacity. Supplies for civilian gasoline are being rationed carefully. As a curious commentary, plants once used to make ethyl chloride for tetraethyl lead now turn out raw materials for "Thiokol," a synthetic rubber. Versatile indeed are the chemical industries—and closely interlinked.

Why 100-Octane?

Now, why insist upon 100-octane fuel? Why would not "premium grade" automotive fuel suffice? The latter averages 80-octane. Is this not good enough? The answer to these questions is to be found in the fact that, compared to even 91-octane gasoline, 100-octane fuel develops about 25% more power at the take-off, maintains the maximum speed of planes at about 1500 feet higher altitude,

[1] *The Lamp*, Standard Oil Co. of New Jersey, August, 1942.

A pilot-plant unit for the study of alkylation reactions. The alkylation of isobutane with the butylenes is the most economic method for the production of isooctane, since equipment and processing costs are lower than for the earlier hydrocodimer methods



Another view of Gulf's big polyforming unit in Texas. Such recent developments as polyforming, hydroforming and catalytic cracking are of the utmost importance in providing excellent base stocks for aviation gasoline

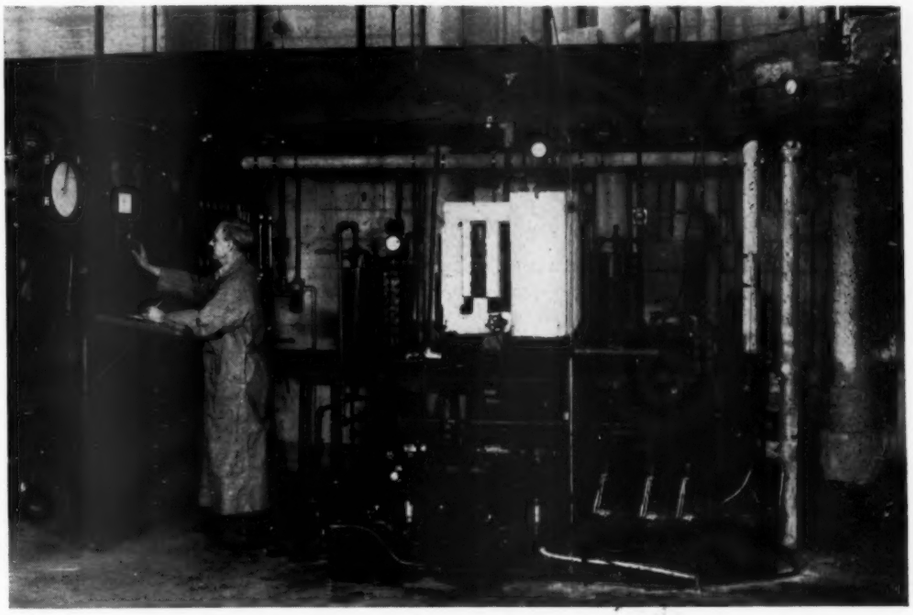
and causes the plane to use about 100 gal. less fuel (roughly 675 lbs. in weight) on a 600-mile trip. Engine weight for planes of identical horsepower, moreover, may be reduced 20% where designed for 100-octane instead of 91-octane gasoline.

Granting, then, that 100-octane fuel is worth striving for, is it possible to produce sufficient quantities of it? Commercial production only began in 1935. As late as 1941 it scarcely exceeded 1% of the total production of gasoline. Recent unofficial estimates place the present program at over 300,000 bbls. of 100-octane gasoline per day. Potential demand is a higher figure. It is known that the average fighting plane has a 1200 horsepower or larger engine, that most bombers have four such engines. Such an engine is said to use 75 to 115 gal. of 100-octane fuel per hour, or 43 to 66 bbls. per flight day of 24 hours. Approximating the average horsepower per plane at 2400, therefore, yields the estimate that 300,000 bbls. per day of 100-octane gasoline could keep about 2700-3000 planes in the air at any given moment. These figures, however, concern only military craft; what about cargo planes? Here the needs become astronomical; one estimate of the amount required early this year placed the figure at 115,500 bbls. per day. Those cargo planes said to be planned for operation by the first of next year would require 595,000 bbls. per day. Whether all needs can be supplied is a moot question, but there can be no question in regard to fuel for fighting planes—that *must* be supplied.

* * *

The molecular engineer thus has been busy at important tasks. Using polymerization, hydrogenation, alkylation, dehydrogenation, isomerization, and aromatization as tools, he has created fuels for the engines of fighting and cargo planes of war and transport planes of peace.

What the future may hold for these reactions and their products only time can tell. Meanwhile, men of the air forces of the United Nations climb into their planes and take off to meet the enemy, confident in the worth of the ships they fly and the fuel they burn; trusting in the continued effort of those "men behind the men behind the guns"—the petroleum research and production chemists and engineers—to Keep 'Em Flying into the purple twilight to rain their ghastly dew.



An early pilot-plant isomerization unit. The isomerization of normal butane to yield isobutane is a process of great importance, since natural supplies of isobutane are insufficient to meet current demands

Wartime Construction Standards for Pumps

Wartime emergency specifications for materials for pumps in refinery service, and compressors and steam turbines, as adopted by E. D. Badger & Sons Co., Boston, refinery engineers, have been published by the Construction Section, Refining Division, Petroleum Administrator for War, in its latest Wartime Plant Design bulletin.

The deviation from normal practice is based on the limitation orders and instructions of various government agencies and on the availability of certain materials. The wartime construction standards for pumps are as follows:

Process Pumps Cold Service	Normal Practice	Wartime Standards
Casings	Steel or semi-steel (Tensile 45,000 psi) for low fire hazard	°Cast iron or semi-steel up to 300-400 psi and maximum working temperature of 300°F.
Impellers	Semi-steel	Same as above.
Wearing Rings	Chrome Alloy	°°Cast iron or semi-steel depending upon pump size and rotative surface speed. Chrome alloy if corrosive.
Shaft Sleeves	Chrome Alloy (Hardened)	°°Nitrided nitralloy, chrome alloy if corrosive
Process Pumps Hot Service		
Casings	Cast Steel	°Semi-steel (Tensile-45,000 psi) up to 350 psi and 500°F. Cast steel for higher pressures and temperatures.
Impellers	Same as Above	Semi-steel up to 500°F. Cast steel for higher temperatures.
Wearing Rings	Chrome Alloy	°°Hardened steel, nitrided nitralloy or chrome alloys if corrosive.
Shaft Sleeves	Chrome Alloy	°°Nitrated nitralloy or chrome alloy if corrosive.
Transfer Pumps		
Casings	Cast Iron	Cast iron
Impellers	Same as Above	Same as above
Wearing Rings	Cast Iron	Cast iron
Shaft Sleeve	Chrome Alloy	°°Nitrided nitralloy or hardened steel
Water Pumps		
Casings	Cast Iron	Cast iron
Impellers	Bronze	Bronze or cast iron
Wearing Rings	Bronze	Bronze or cast iron
Shaft Sleeves	Bronze	Bronze
Gas Engine Compressors	—	°°Compressors are subject to War Production Board Order No. L-100 which provides that an order for compressors cannot be accepted by any manufacturer without authorization by the Director of Industry Operations, W.P.B. Washington.
AIR compressors (Steam, Electric or Engine Driven)		
Steam Turbines (Mechanical Drive)	—	This type of equipment has not been restricted. The present materials of construction are very similar to those used in the pre-war period. For lower steam temperature and pressures cold rolled steel is being used for blading rather than chrome alloys. All governor valve trim is now hardened steel rather than chrome alloy.
Reciprocating Pumps		
Liquid Ends	Cast Iron-semi-steel & steel	Cast iron, semi-steel & steel
Liquid Piston Rod	Chrome Alloy	°°Hardened steel except if corrosion service
Liquid Valve Service	Chrome Alloys	°°Drop forged steel chrome alloys if corrosion service
Steam Ends	Cast Iron or Semi-steel	Cast iron or semi-steel
Steam Valve Gear Type	Sliding "D" up to 450°F. — piston valve gear from 450°F.	Same

°Critical material available
°°WPB orders and limitations

Normal Butane Conversion*

Full Utilization of C_4 Fractions by Processes Now Available Provide Means for Natural Gasoline Manufacturers to Share in New Markets

By R. C. Alden**

Conversion of normal butane to isobutane with the subsequent processing of isobutane into materials for aviation gasoline is shown to provide a wider field of operations for natural gasoline manufacturers, in supplying products vitally needed in the nation's war efforts. Possibilities discussed include manufacture of "field" isobutane, isomerization of normal butane into isobutane, addition of an isobutane cracker to provide isobutylene for feed for codimer or alkylation plants and the addition of such latter units to the natural gasoline refiner's operations.

An operating unit is described, operated in conjunction with a codimer plant, in which isobutane is thermally cracked to produce propylene and isobutylene, the recovery of useful olefins being approximately 75% of isobutane cracked.

AT THIS time, with isobutane so much in the forefront, some explanation should be given for choosing to discuss normal butane. With the advent of butane isomerization processes isobutane and normal butane are becoming almost synonymous. If, as some seem to think, there is to be a shortage of isobutane, attention must then be focused on normal butane. It is further of significance to note that the tremendous refinery uses of C_4 hydrocarbons is bringing about a definite problem in motor fuel volatility. Propane as a substitute for butane in motor fuel is under serious consideration in many places. All of these trends provide incentives for natural gasoline manufacturers to increase C_4 extraction at natural gasoline plants. Normal butane may become as important as isobutane has already become.

Referring to the processes for the manufacture of aviation gasoline from light hydrocarbons, it is characteristic of them that a large portion of their investment and critical material usage is for the fractionation of the light hydrocarbons. The deisobutanizer or "butane splitter" is a substantial part of the investment in butane isomerization plants, in alkylation plants and in codimer plants. Thus any natural gasoline manufacturer who is seriously considering a "butane splitter" for the segregation of field isobutane should also study the amplification of his project to include at least butane isomerization and perhaps alkylate or codimer production.

To illustrate the point made in the preceding paragraph, simplified flow diagrams of 4 process arrangements are shown in Fig. 1. In each case, C_4 and lighter from natural gasoline is the entire feed to the system.

In these 4 diagrams each succeeding one is identical to its predecessor except for the addition of one or more operations. The sizes of the various units, of course, will depend on the successive operations.

In Fig. 1 the solid flow lines represent the simple case of the segregation of isobutane from natural gasoline C_4's and lighter. Equipment requirements are a "butane splitter" and a depropanizer. The operation segregates the feed into 3 streams: isobutane, normal butane and propane and lighter.

The dashed flow lines in Fig. 1 represent the flow diagram for the addition of a butane isomerization unit to the system previously described. To the equipment has been added an isomerization unit to which is fed normal butane from the "butane splitter" and whose output is added to the feed of the "butane splitter". Obviously, the columns will have to be increased in size, but the fractionation steps are the same. In this operation 2 products are made: isobutane and propane and lighter.

It is a rare thing for an adequate olefin bearing stream to be available to a field natural gasoline situation. The crossed flow lines in Fig. 1 represent the addition of an isobutane cracker to the equipment already provided. All or a portion of the isobutane from the depropanizer is fed to the isobutane cracker. In the cracker the isobutane is cracked to a depth of 20 to 30%. The C_3-C_4 content of the cracked gas is ideal for feed to a codimer plant, or mixed with uncracked isobutane is ideal feed for an alkylation unit. In the event that neither of these units is installed, the product should be of interest to refiners with alkylation or codimer facilities.

As a final step, the circle lines in Fig. 1 show flow for the addition of an alkylation or codimer unit. In the case of a codimer unit all the isobutane from the depropanizer would be charged to the isobutane cracker. In the case of an alkylation unit only a portion goes to the isobutane cracker.

The effluent of the conversion unit passes to a debutanizer whose kettle product is the alkylate or codimer. The overhead C_4's and lighter is fed to the "butane splitter" (or to the depropanizer or to the conversion unit feed or to any combination of these three).

Of particular interest in this sequence of flow diagrams is that portion of Fig. 1 which shows the isobutane cracker, since this provides an olefin bearing stream for subsequent conversion operations. The flow diagram for this operation together with the flow for the codimer plant is shown in somewhat greater detailed in Fig. 2, which is self-explanatory.

Phillips Petroleum Co. has had in operation for 5 years a plant in which isobutane is thermally cracked to produce propylene and isobutylene. The cracking unit consists of a gas-fired furnace containing an all welded coil of 4-in. OD by 3½ in. ID 18-8 chrome nickel alloy tubing having an aggregate length of 2511 ft.

Operating temperatures have been in the range 1200° F. to 1350° F.; usual flow rates have been from 75,000 to 125,000 gal. of isobutane per day; and pressures have been in the range of 60 to 80 p.s.i. gauge.

Conversion of isobutane per pass through the cracking coil has been approximately 25%. Ultimate yield of isobutylene per 100 lbs. of isobutane destroyed has been about 50 lbs. In addition about 25 lbs. of propylene have been obtained, making the total yield of useful olefins 75 lbs. per 100 lbs. of isobutane cracked. A considerable quantity of hydrogen is also produced.

The isobutane cracker is simple in design and operation, and requires a relatively small amount of critical materials for its construction.

For most efficient operation, the isobutane

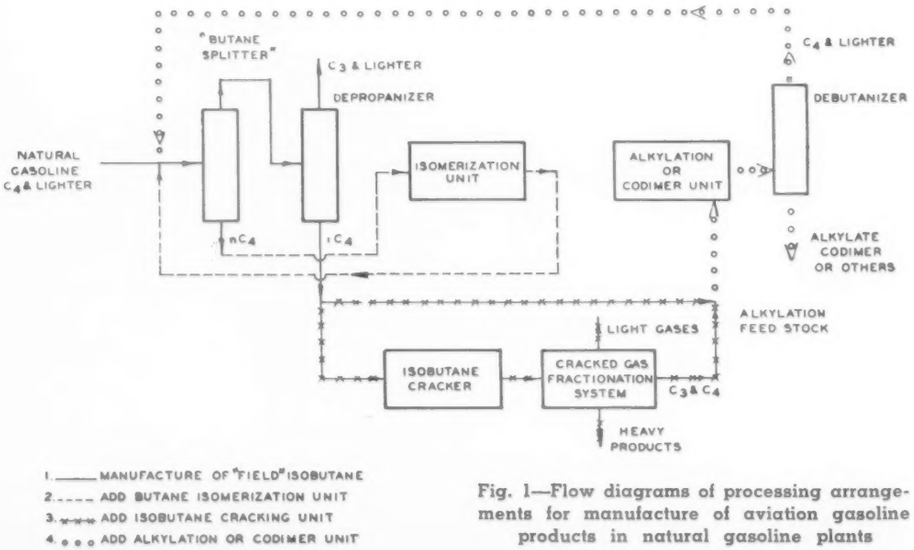


Fig. 1—Flow diagrams of processing arrangements for manufacture of aviation gasoline products in natural gasoline plants

* Presented at 22nd annual convention Natural Gasoline Assn. of America, Dallas, April 15, 1943.

** Manager research and development department, Phillips Petroleum Co., Bartlesville, Okla.

WHAT IS Chemical Grade*?

LIQUEFIED PETROLEUM GAS

Chemical Grade* ISO-BUTANE

High purity Iso-Butane manufactured under definite composition specifications and low maximum Propane content. Most important use is in alkylation processes for manufacture of 100 octane aviation gasoline.

Chemical Grade* NORMAL BUTANE

95% Normal Butane content for chemical plants and refineries for a number of processes, principally for isomerization to Iso-Butane and for the manufacture of Butadiene. Some polymerization operations also require this high grade product. Its use in the chemical industry is increasing.

Chemical Grade* PROPANE

95 to 98% purity for many chemical processes. This grade of Propane is now used in the manufacture of a major portion of all lubricating oil. The use of large quantities of styrene for making synthetic rubber has also increased the demand for this grade of Propane. Other chemical industry uses are for nitration and chlorination operations.

*Copyright 1943, Warren Petroleum Corp.

WARREN
PETROLEUM CORPORATION
Tulsa, Oklahoma
Manufacturers, Exporters and Marketers of
Natural Gasoline and Liquefied Petroleum Gas

used for olefin production should be pure. However, the presence of normal butane and lighter hydrocarbons in an aggregate amount of the order of 10% or less will not seriously affect the cracking operation.

Normal butane is the hydrocarbon most likely to occur as an impurity. Since normal butane is somewhat less stable than isobutane, it is decomposed to a greater extent than is isobutane in a given time at a fixed temperature. The decomposition products of normal butane are principally hydrogen, methane, ethylene and propylene. Only about 12% of the normal butane cracked reacts to form normal butylenes. In most present applications, butylenes are more useful than propylene or ethylene. Consequently, normal butane should be kept at as low a concentration as possible.

Propane cracks to form principally propylene, ethylene, methane and hydrogen. It is much less reactive than the butanes, and acts substantially as a diluent when present in small amounts in isobutane being cracked. Since ethane and methane are even less reactive than propane, they also may be considered as diluents of the isobutane if they are present in small amounts. The principal objection to propane, ethane and methane as impurities in cracker feed isobutane is that they increase the size of the cracking and separation equipment without yielding compensating amounts of useful products.

Pentanes plus heavier compounds should not be permitted in the cracker feed isobutane in a concentration greater than 1 or 2%. These heavier compounds crack much more readily than butane and lighter hydrocarbons, and some of their decomposition products tend to degrade rapidly into tars and coke.

Olefins in the cracker feed isobutane will crack to yield olefins of lower molecular weight and other products. They will also polymerize thermally, but this reaction is affected by the concentration of the olefins. Butylenes may be present in the isobutane to the extent of about 2% without noticeably increasing the coke and tar formation. Propylene and ethylene can be tolerated in somewhat larger percentage because of their greater stability.

If sulfur compounds are present in the cracker feed isobutane they will crack and undergo other reactions similar to those of hydrocarbons. Sulfur will consequently be found in the olefinic products. Since most applications of isobutylene and propylene require them to be substantially free of sulfur compounds, it will usually be found desirable to free isobutane of sulfur compounds before using it for cracking stock.

Table I shows typical feed and product compositions for the isobutane cracker, when operating in conjunction with a polymerization (or codimer) unit. The composition of the product C_3 and C_4 is suitable for charging to a polymerization (or codimer) unit as shown in Fig. 1 and in some detail in Fig. 2. With uncracked isobutane added the product C_3 and C_4 is ideal as a feed stock to an alkylation unit as shown in Fig. 1.

It is of importance to consider the post war possibilities of going the extreme route on the flow diagram in Fig. 1 where isomerization, isobutane cracking and alkylation are

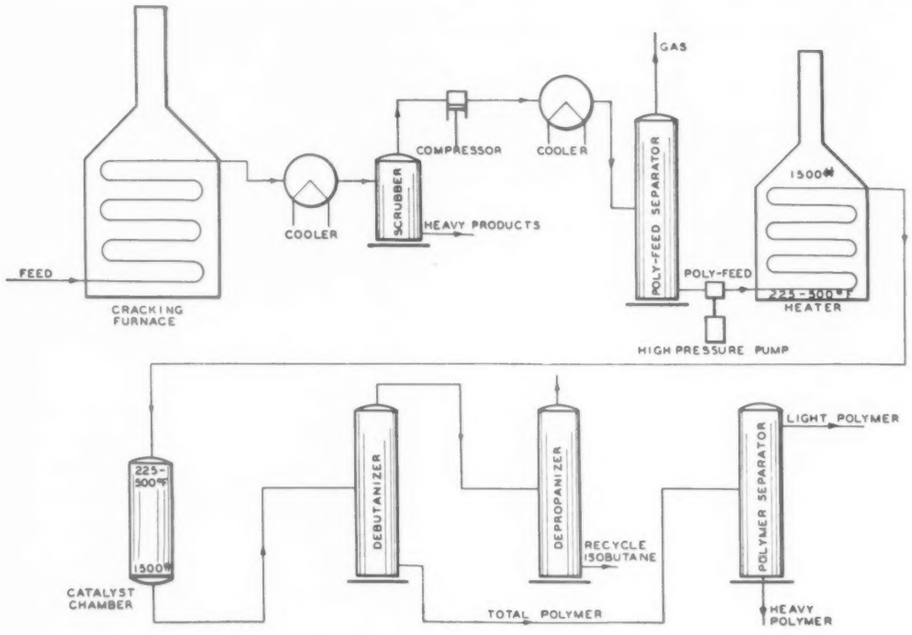


FIG. 2 PHILLIPS CATALYTIC POLYMERIZATION PROCESS

Fig. 2—Flow diagram of plant to thermally crack isobutane to produce propylene and isobutylene, together with diagram of the catalytic polymerization plant for which the isobutane cracking operation provides feed for codimer manufacture

put into practice, assuming that butanes extraction has been raised to well above 90% and all the butanes are processed to produce alkylate. Under these circumstances it is estimated that the blend of butane-free natural gasoline and alkylate would have a Reid vapor pressure well under 10 lbs. and an A.S.T.M. octane number unleaded of about 80. If in the course of developing the full war time potential of the situation, facilities were installed for the segregation of normal and isopentane, means would be at hand for controlling vapor pressure and antiknock characteristics over a considerable range.

It is therefore evident that these newer operations provide a means either now or in the future for the natural gasoline manufacturer to become a motor fuel manufacturer.

There are, of course, many other process possibilities for the natural gasoline hydrocarbons. The writer has presented the most simple ones partly to simplify the matter but more importantly because the things here discussed are almost entirely covered in pre-Pearl Harbor literature and in issued patents. Nevertheless, the comparatively simple processes described here serve to illustrate the new importance of normal butane.

It should be stated that there is not an easy road to the wartime installation of such process steps in natural gasoline situations. Of paramount importance to the war effort is the accomplishment of the necessary results with the minimum expenditure of critical materials, transportation, time and manpower. Basically the problem is to find adequate supplies of isobutane and olefins to manufacture the required quantities of alkylate. Olefins can often be made in increased quantities by revising refinery operations. Normal butane for isomerization is abundantly available at refineries. Where conversion facilities already exist there are many possibilities of raising production by the elimination of bottlenecks. All of these things must be taken into account before "ground-up" proposals can receive serious consideration.

On the other hand, the writer has seen each successive estimate of the requirements for aviation gasoline higher than its predecessor. There has been no recession. It is probable that as long as the war lasts the requirements will continue to increase. To be forehanded, natural gasoline manufacturers should be developing projects for consideration by government agencies. In the meantime no greater service to the war effort can be performed than to take every step to increase deliveries of normal butane and isobutane as relatively pure materials or as mixed butanes or in natural gasoline to refineries that have facilities for converting these materials to 100 octane gasoline or to synthetic rubber.

Table 1—Isobutane Cracking Operating Conditions and Products

(Furnace with 2 parallel coils)

Total Isobutane Feed (gal. per day)	123,000
Pressure at inlet (lb. per sq. in. gage)	97
Pressure at outlet (lb. per sq. in. gage)	26
Temperatures °F.	
Furnace inlet (after heat exchange)	600
Outlet of convection sections	890
Outlet of radiant sections	1,350
Feed Compositions, Weight %	
C_3H_8 and lighter	1.11
C_4H_8	1.33
iC_4H_8 ($+nC_4H_8$)	1.28
iC_4H_{10} ($+nC_4H_{10}$)	95.74
C_5+	0.54
	100.00
Product Composition, Weight %	
H_2	0.40
CH_4	4.64
C_2H_4	0.95
C_2H_6	8.57
C_3H_8	1.83
iC_4H_8 ($+nC_4H_8$)	13.83
iC_4H_{10} ($+nC_4H_{10}$)	68.61
C_5+	1.17
	100.00
% Isobutane Cracked Per Pass	28
Ultimate Yields	
Lbs. iC_4H_8 Per 100 lbs. C_4 feed	49
Lbs. C_3H_6 (net) per 100 lbs. C_4 feed	26
Total Useful Products Per 100 lbs. C_4 feed	75

Slushing Type Rust Preventives*

By S. L. Bishkin**

The need for protection of much military equipment from corrosion during the period of its storage and shipment to far-off fighting fronts has focussed attention on the use of the non-drying or slushing type of rust preventive compounds which many oil companies supply.

The accompanying article is a comprehensive review of available data on slushing coatings by an authority on this subject, in which is included a compilation of the various types of these compounds. Due to the relatively minor role which these oil company products have played in industry until the present war, the development work on the compounds has been limited to date and mostly of an experimental nature.

More emphasis has been placed on meeting purchasers' specifications and on matching competitors' products than on determining the fundamental principles of the nature of effective coatings, it is brought out. Industry would be aided materially by a more scientific investigation of slushing compounds, the author concludes.

Following is a principal portion of the report presented by Mr. Bishkin before the National Lubricating Grease Institute. Certain portions of the text, however, including the introduction, have been omitted.

SLUSHING type coatings are used extensively for protection against rust. For example, the coatings are used for airplane engines, armatures, autos, metal furniture, tool joints, precision parts, submarine ballast, tanks, turbines, and for many other metallic sub stances. Many of the coatings are playing a vital part in the war effort. A more complete list of the uses of the slushing coatings is given in Table 1†.

Slushing coatings are applied by a number of methods, the most common of which are: spraying, dipping, swabbing and brushing. The type of application is ascertained from a consideration of the consistency of the coating; type of surface on which it will be applied; the speed of application necessary; availability of equipment such as heating pots, dipping vats, spray equipment and the like; and the accessibility of the surface to be coated—for example, the inside of a long tubing.

Spraying: As a rule products are sprayed only when fluid at conditions of application. Mechanical equipment is available however, for spraying products of heavy consistency. Heated solids and semisolids have the tendency to congeal in the spraying equipment. This is minimized by the maintenance of elevated temperature on all piping through which the compound is forced. Often heavy slushing compounds are diluted with solvents to reduce the consistency to that used normally in spraying.

Dipping: The method of dipping is most easily used with slushing compounds which are fluid at temperature of application. This process, however, is used frequently with other slushing compounds by warming the coatings. Caution should be exercised when slushing compounds containing low flash point solvents are heated. Care should also be taken not to heat the compounds too long nor too rapidly for some compounds will deteriorate under these conditions.

Both small and large parts may be dipped. Large objects may be placed directly into dipping tank, whereas small objects are generally placed in baskets or held by some fastening device during the dipping. The articles dipped should remain in the tank until they are warm and, in order to produce a thin coating, the dipped articles should remain in the tank until equilibrium is reached.

Swabbing: Easily accomplished and for this reason commonly used. The heavier slushing compounds, especially the semisolids and solids, must be heated before application. In one common method of swabbing the coating is heated, poured into a garden sprayer, poured on the pipe line and the coating swabbed with a rag. (Fig. 1.)

Brushing: Generally used for light liquids. As in the other methods heavier coatings may be warmed and then applied.

Other Methods: A number of other methods based on one or more combinations of the procedures just described are used for the application of the slushing coatings. In one of these, for example, flat steel sheets are treated with slushing coatings by a roller method as they pass through processing grooves.

Best results in application are secured from slushing coatings when the heavier consisten-

Fig. 1—Application of slushing type of rust preventive coating to pipe line by swabbing

Table 1—List of Principal Uses for Slushing Type Rust Preventives

- Armatures
- Autos
- Battery terminals
- Bearings
- Blades
  - Saw
  - Razor
- Bridges, metal
- Buildings, metal
- Cables
- Cans, ice
- Chains
- Car journals
- Cars
  - Railway
    - (underframes & undercarriages)
  - Tank
- Castings
- Coils, condensor
- Cartridge clips
- Dies
- Drives, sprocket
- Drums, steel
  - (interior and exterior)
- Engines
  - Aircraft
  - Automotive
    - (interiors)
- Equipment, marine
  - Polished
- Fences
- Fire arms
- Fire escapes
- Furniture, metal
- Gears, exposed
- Guns
- Joints, tool
- Machined surfaces
- Machinery
  - (in storage)
  - Textile
- Needles, sewing machine
- Nuts and bolts
- Parts,
  - Precision
  - Motor
- Pipe
  - (above and underground)
  - Stove
- Plate, boiler after pickling
- Rings, piston
- Rods, sucker
- Scales
- Shells
- Signs, metal
- Springs, bed
- Steel
  - Auto body
  - Bar
  - Steel exposed to acid fumes and severe climatic conditions
  - Polished bar stock
  - Structural
- Submarine ballast
- Tanks
  - Water
  - (interior and exterior of vapor space)
- Tools, in storage
- Turbine interiors
- Valves
- Vehicles
- Vessel hulls

*A portion of a paper with this title presented before the annual meeting of the National Lubricating Grease Institute, New Orleans, Oct. 28, 1942.

The complete text of this paper appears in the February, March and April 1943 issues of *The Institute Spokesman*, official publication of the grease institute.

**Humble Oil & Refining Co., Houston.

†The numbering and arrangement of figures, tables and photographs in this article is not the same as that in the original paper.

cies are applied in molten state or in solution. The reason for this is that under these conditions a continuous film is produced.

LITERATURE

Articles: Only a limited number of articles on slushing compounds are in English. Reference to some of these is shown in the accompanying bibliography. The essential information in a number of the articles reviewed is summarized below:

One of the earlier investigations on slushing compounds was made by the Paint Manufacturers Assn. of the U. S. (A)[2]. This report commented on the nature of slushing compounds, gave some ordinary uses for the compounds, suggested a formula (petrolatum 50 lbs., zinc dust 30 lbs., aluminum powder 5 lbs. and mineral spirits 5 lbs. optional) and also reviewed Federal Specifications 239 and 293. Compositions of rust preventives found in all the literature reviewed are shown in Tables 2 to 6 inclusive; however the suggested formula given above was omitted.

Another early investigation on slushing type rust preventives was made by the Bureau of Standards in 1920 (C)[2]. This reference reviewed the nature of slushing compounds, and showed that certain semisolid consistency greases made of petrolatum and small proportions of wax and rosins were effective. Suggested specifications were given. These are found in Table 2 and also in reference (C)[2].

Researches conducted at the National Physical Laboratory in 1925 showed that crude lanolin was an effective rust preventing material (D)[2]. More comprehensive tests were published by the same laboratory in 1934 (B)[2], in which it was reported the crude lanolin dissolved in white spirits or solvent naphtha was effective as a rust preventive. It was also shown that small amounts of specified dyes were helpful in identifying objects that had been coated. The quality of lanolin was reviewed and it was pointed out that the acidity of lanolin did not have a great effect on its protection of steel, but that lanolin with low acidity was better. Experiments in which small quantities of waxes were introduced into the composition of the slushing coatings showed that they made the coatings harder and therefore less affected by frequent handling. Comparative tests were also conducted on lanolin and petrolatum coatings from which it was concluded that the lanolin coatings were better. Other references showed that the petrolatum blends were superior.

It is believed that the main component of lanolin is a mixture of esters of cholesterin ($C_{26}H_{43}OH$), an alcohol, and fatty acids. Apparently these esters consisting of 50 or more carbon atoms provide a surface film of high protective quality. The highly polar molecules of this type are adsorbed on surfaces and adjust themselves in a closely packed fashion.

Patents: A rough survey of the patent literature was made by means of the chemical abstracts. Only the period 1917 through 1941 was considered. The compositions of the coatings studied were arranged first according to the main ingredient and then subdivided alphabetically by the other principal ingredients.

[2]See Bibliography.

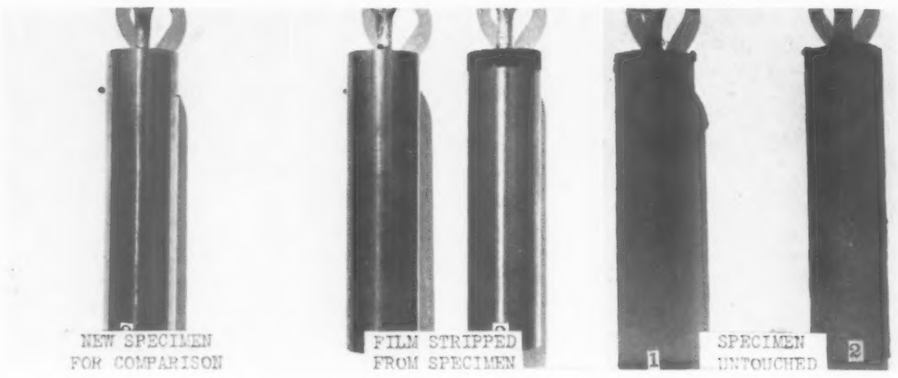


Fig. 2—Left, new specimen of polished steel rod used in exposure test: center, test pieces after removal of coating following 195 days of weathering outdoors: right, unprotected specimens after 195 days of weathering

Table 2—Compositions of Slushing Type Rust Preventives

Coatings Containing Petrolatum

Other Principal Ingredient	Amount Petrolatum	Other Ingredients	Use	Patent No. Or Other Reference
Aluminum Soap of Coconut Oil		Paraffin Potassium Hydroxide Potassium Chromate	General	U. S. 1,472,239
Aluminum Stearate			Temporary protection airplane motors	(Aviapromyshlennost (U.S.S.R.) 1938, No. 2, 12-31; Khim. Referat. Zhur. 1, No. 10, 82 (1938). V. I. Shushin, Corrosion Resistance in the Prod. of Airplane Motors)
Beeswax or Paraffin		Heavy Mineral Oil & Gasoline may be substituted for the petrolatum. Beeswax may also be used.	General	Brit. 248,463
Lactone and Ester		Mineral Oil or Aldehyde or Ketone	Removal and prevention	Fr. 660,451
Lanolin		Spindle Oil Machine Oil, etc.	Steel	(Ser. Gorno-Rudnaya Prom. 1935, No. 41-42, 13-14. Stepanov. Novosti Tekhniki. Lubricants Protecting Metals from Corrosion)
Oil, Petroleum 85%	5%	Drying Oil 10% Drier	Galvanic cell terminals	Russian 3780
Oil, heavy refined		Rosin, Paraffin and Salt	Battery terminals	U. S. 1,914,964
Paraffin		Resin or mixture with Paraffin; jute impregnated with this composition as cover	Lead covered electric cables	Brit. 277,017
Paraffin Wax		Lead Resinate 2%	Ferrous material	Russ. 33,242
Pine Fatty Acids			Roll strip steel during handling	U. S. 2,069,626
Red Lead 29%	(Vaseline) 45%	Asphaltum 25% Odorant 1%	General use	Can. 265,121
Rosin		or Zinc Naphthenate		(J. Chem. Ind. U. S. S. R.) 14,1708-19 (1937) M. V. Borodulin and V. N. Nemchinova. Lubricating Materials in the Prevention of Corrosion.
Rosin—20 grams	100 grams	Kerosene 10 cc		
Rosin—6 parts	50 parts	3 parts Candelilla Wax		
Rosin—5 parts	50 parts	Carnauba Wax—2 parts		
Sodium Carbonate 64 parts	80 parts (Pet. Jelly)	Oil of Cedar—1	Battery terminals	U. S. 1,558,589
Sodium Nitrite 50 grams to	2 Kilos (Vaseline)	(or glycerol)		
White Lead 5 parts	5 parts	Lube Oil—1 part	Iron or steel or other volatile material	U. S. 1,538,067

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For example, in Table 2 all of the petrolatum coatings are grouped together. To determine what other ingredients are in a certain composition, reference should be made to the extreme left column in which these ingredients are listed alphabetically. A specific illustration is "Petroleum Oil," the sixth item. The amount of oil in this composition is shown as 85%; in the second column, the amount of the petrolatum; in the third column, the amount of other ingredients, e.g. drying oil 10% and an unspecified amount of drier; in the fourth column the use for which this composition is recommended by the patent and in the fifth column the patent from which the composition was taken or other reference.

The composition is shown in subsequent charts for coatings containing soap and sulfonic acid, Table 3; amines, Table 4; wool fat, Table 5; and miscellaneous materials, Table 6.

Comments: Properly formulated and correctly applied blends of petrolatum and mineral oils have been used extensively because of the relatively good protection given and because of the low cost and availability. The protective nature of such blends varies with the viscosity and the amount of other proven additives, such as rosin, certain waxes, and oxidized petroleum residue. Polar compounds such as fatty acids, oils, alcohols, and the like are inferior to those derived from saturated hydrocarbons or mineral oil; however, spermaceti wax and lanolin are satisfactory. Some inhibitors, such as sodium dichromate, have proved unsatisfactory in numerous instances. One reason is that the sodium dichromate is normally emulsified in oily type material, in which form it is ineffective. It has also been found by a number of investigators that mineral solvents are better than chlorinated hydrocarbons for slushing type rust preventives. This is explained by the reaction of entrained moisture with the chlorinated hydrocarbons to form corrosive materials. Amines, some of which are shown in the compositions in Table 4, are helpful as neutralizing agents for acidic products. Zinc dust has been found effective in many practical applications as a component of neutral petrolatum blends.

Not much literature was available on the efficiency of most of the ingredients included in Tables 2 through 6. A few comments are made above about some of the ingredients of the slushing compounds. It is safe to say that many of the materials used in the slushing compositions are worthless, and a number which are effective have limited application.

Summary of Government Specifications On Slushing Compounds

(This portion of the original paper is omitted here for the reason, as the author himself points out, that specifications for these materials are subject to frequent revisions. It is brought out that the length of service expected by government agencies for rust preventive compounds varies from 2 months to 10 years. A service test is now required on a number of compounds. In some instances, however, the government agency will waive the service test if the vendor supplies an affidavit to the effect the slushing compound

Table 3—Compositions of Slushing Type Rust Preventives

Coatings Containing Soap and Sulfonic Acid

Other Important Ingredient	Name of Soap and Amount	Other Ingredients	Use	Patent No. Or Other Reference
Aromatic Hydrocarbon	Chromium Naphthenate		General	Russian 37,206
Condensation Products (99-65%) of Chlorinated Wax and Aromatic Hydrocarbon	Mahogany Soap 1-35%		General	U. S. 2,119,553
Hydrocarbon Oil	Sulfonic Acid—3-35%		General	U. S. 1,630,101
Lard—73.5%	Aluminum Stearate 10%	Butyl Alcohol 10% Triethanolamine 6.5%	Interior and exterior of airplane engine surfaces	(702; Aviapromyshlennost 1939, No. 7-8, 9-24. V. A. Yakhlakov. Protective Greases for Airplane Engines.
Lubricating Oil	Manganese Oleate—or Manganese Chromate		To clean and prevent rust	Brit. 478,273
Mineral, Animal or Vegetable Oil	Nickel Oleate—or Chromate (Colloidal Type) 1%		Lubricant which prevents and removes rust	Brit. 455,096
Mineral Grease (Petrolatum)	Aluminum Stearate		Temporary protection airplane motors	(Aviapromyshlennost (U. S. S. R.) 1938, No. 2, 12-31; Khim. Referat. Zhur. 1, No. 10, 82 (1938). V. I. Shushin. Corrosion Resistance in the Prod. of Airplane Motors)
Montan Wax	Sodium Sulfonate	With or without mineral oil	Ferrous metallic surfaces	U. S. 1,795,993
Petrolatum	Aluminum Soap of Coconut Oil	Paraffin Oil Potassium Hydroxide Potassium Chromate	General	U. S. 1,472,239
Spindle Oil, etc. 81 parts	Sulfonic Acid—(oil insoluble) 15%		Metallic machinery in contact with aqueous medium	Can. 362,601
Water—47 parts (trace of formaldehyde)	Soap—16 parts	Sodium Carbonate 8 parts Glycerol—10 parts	General	U. S. 1,400,395
Wool Fat	Alkali Sulfonate			U. S. 2,182,992

Table 4—Compositions of Slushing Type Rust Preventives

Coatings Containing Amines

Amines (Full Name)	Amount	Other Ingredients	Use	Patent No. Or Other Reference
Amine, Thiodi-alpha naphthylamine (and similar compounds)			Special alloys bearings	U. S. 2,220,723
Amyl Amine	5-10 parts	Sodium Hydroxide 10-15 parts Water—1000 parts	Rust proofing iron	U. S. 1,433,226
Benzyl Amine (or other aralkylamine)			Inhibitor ferrous metals in contact with water or alcohol	U. S. 2,164,564
Dibutylthiourea (or other similar types)		Plus Lubricating Oil	Special alloy bearings	U. S. 2,209,464
Diamino diphenyl Amine		Mineral Hydrocarbon Oil	Special alloy bearings	U. S. 2,220,487
Diamino Polyaryl Methane		Lube Oil	Special alloy bearings	U. S. 2,218,917
Thio-dinaphthyl Amine	0.2% or more	Mineral Hydrocarbon Oil	Special alloy bearings	U. S. 2,227,908
Tri-ethanol Amine	6.5%	Lard 73.5% Butanol 10% Aluminum Stearate 10%	Interior and exterior airplane surfaces	(702; Aviapromyshlennost 1939, No. 7-8, 9-24. V. A. Yakhlakov. Protective Greases for Airplane Engines.
Triethanolamine Oleate	1.5%	Oil 98%	Interior and exterior airplane surfaces	(Same as above)
Triethanolamine	0.5%			

Table 5—Compositions of Slushing Type Rust Preventives

Coatings Containing Wool Fat

Other Important Ingredients	Other Ingredients	Use	Patent No. Or Other Reference
Carbon Tetrachloride of Trichloroethylene		General use	Brit. 163,474
Oil, Lube		Lubricant and rust preventive	Can. 267,375
Paraffin up to 10%	Ceresin up to 3% if in White Spirits Solution	General use	
Petrolatum	Lanolin Spindle Oil Machine Oil	Steel	(Ser. Gorno-Rudnaya Prom. 1935, No. 41-42. 13-14. Stepanov. Novosti Tekhniki. Lubricants Protecting Metals from Corrosion)
Resin, Hard (Hydrocarbon Soluble)	May also include Petroleum Jelly, Paraffin, Beeswax, Carnauba, Pigments	General use	Brit. 503,772 and Brit. 505,482
Solvent, Non-Acid Non-Volatile (or Mineral Hydrocarbon) or Lube Oil		General use	Brit. 1,624,938
Sulfonate, Alkali		General use	U. S. 2,182,992
Spirits, White (or Solvent Naphtha)—50%		General use	

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in question has given comparable service in other applications.)

Evaluation Tests: A number of evaluation tests may be conducted on slushing type preventives, namely: actual performance, exposure, accelerated corrosion and adhesion, and determination of essential physical and chemical properties. A product which meets these tests should prevent corrosion, should not affect the metal, should resist the corrosive influences without altering its own composition adversely, should be removable without injury to the metal it protects, should adhere to the surface under the conditions prescribed, should be applicable by standard methods, and should be economical. Sometimes additional characteristics are required of a rust preventive, such as ability to neutralize acidic substances, and to lubricate.

For brevity, only a limited number of the evaluation tests will be described.

Actual Performance Test: An example of an actual performance test is given in Navy Specifications 14-C-6a, Sec. F-3(a)4. In this test, a submarine ballast tank is coated with the material under observation and also with a compound which has been tested and previously reported as satisfactory. The relative performance is determined after 9 months' actual service.

An exposure test conducted outdoors by 1 company is illustrated in Fig. 2. The specimen shown at the left of the illustration is a cold rolled premium grade polished steel rod 1.5 in. in diameter, 6 in. long. This test piece was used for comparison with the weathered specimen shown in another portion of the picture. In the right are exhibited 2 specimens after 195 days of weathering outdoors. In the center are shown the test pieces after the removal of the coating. In a similar manner a number of other coatings were tested to ascertain how they would protect the steel outdoors and also whether the coatings adhered to the surface under these conditions. The same tests were repeated indoors.

Exposure Tests Under Ordinary Conditions

On land: Often evaluation of slushing compounds is made by exposure to the elements but not under actual operating conditions. For example, in the Navy (Ships) Specification 52-C-18, a ¾-in. diameter, 6-in. long mild steel specimen is coated with a specified thickness of slushing compound, is air-dried for 24 hours and is exposed upright indoors for 50 weeks. Weathering of Grade II for 6 months and Grade III for 4 months in a shed is required by the same specification.

On water: Another exposure test under ordinary conditions and unlike the service to which it would be put was conducted by one company on marine slushing coatings. Hot roll steel plates 6 ft. x 13 in. x ⅛ in. were used. The edges were rounded and the total surface sandblasted. A general view of the testing site is given Fig. 3. The test, as seen from the picture, was conducted at a marine oil drilling rig a number of miles from land. The panels were divided in 3 sections: The top to simulate location of topside coatings on ship; the center the boot topping section; the lower where antifouling compositions are generally applied. Some of the panels were halved

Table 6—Compositions of Slushing Type Rust Preventives

Other Miscellaneous Coatings

Principal Ingredient	Amount	Other Ingredients	Use	Patent No. Or Other Reference
Acid, Oleic (or higher Carboxylic Acid)		Lubricating Oil	Internal combustion engines	Can. 364,928
Acid, Oleic (Stearic or Palmitic)		Water, Glycerol and Ethylene Glycol	Iron	U. S. 1,752 145
Acid, Phosphoric, Diphenyl		Refined Mineral Oil	Steel sheets	U. S. 2,224,695
Alcohol, Butyl (Secondary)		Potassium Hydroxide (with or without EtOH); Fatty Acids; Petroleum Solvent; Pigments	Iron and steel	Australian 102,542.
Alizarin (or similar material)		plus Lubricating Oil	Bearings	U. S. 2,214,443
Amine, Benzyl (or Aralkyl Amine)			Inhibitor ferrous metals in contact with water or alcohol	U. S. 2,164,564
Arsenite, Tributyl or Triamyl	0.2% or less	Lubricating Oil	Special Alloy bearings	U. S. 2,213,856
Benzonitrile	0.2% Minimum	Lubricating Oil	Special Alloy bearings	U. S. 2,239,752
Carbonate, Sodium	88%	Ammonium Sulfate 12%; and enough Oil to form Paste	Battery terminals	U. S. 1,710,227
Chloride, Zinc	48 Parts	Glycerol 4 Parts; Zinc Sulfate 2 parts; Water 46 parts	Wire wheels, auto rims	U. S. 1,498,259
Cresol		Lubricating Oil	Internal combustion engines	Brit. 434,240
Grease, Axle	70-80 Parts	Rape Oil 10-20 parts; Concentrated Water Glass Solution 5-10 parts	General use	Swiss, 177,194
Lard	73.5%	Butanol 10%; Aluminum Stearate 10%; Triethanol Amine 6.5%	Interior and exterior airplane surfaces	(702; Aviapromyshlennost 1939, No. 7-8, 9-24, V. A. Yakhlakov. Protective Greases for Airplane Engines).
Lard	16 parts	Black Lead 4 parts; Camphor 1 part	Bright metals	Brit. 176,246
Morpholine (derivative)	0.5-0.2%	Plus Mineral Oil	Special alloys	U. S. 2,239,841
Oil		Graphite Thinner (or heavy Grease) Odorant	Heavy bearings	Brit. 353,295
Oil, Castor		Alcohol, With or Without Phosphoric Acid and Fusel Oil		U. S. 1,428,085
Oil, Cylinder	80%	Ceresin 20%		(J. Chem. Ind. (U. S. S. R.) 15, 48-51 1938; of. C.A. 32 2331. V. N. Nemchinova. Lubricating Materials as Corrosion Preventive. II Studies in the Factory.
Oil, Drying (gelatinized)		Semi-Drying Oil; Mineral Oil; Drier	General use	Brit. 494,963
Oil, Lard	25 parts	Lubricating Oil 25 parts; White Lead 25 parts; Graphite 15 parts; Borax 5 parts; Lampblack 5 parts	Coating steam boiler or pipes	U. S. 1,460,317
Oil, Lard		Carbolic Acid	Firearms	U. S. 1,847,015
Oil, Linseed (Boiled)	10%	Petroleum Oil Distillate; 2% Pine Oil; 2% Oleic Acid; Drier	Prevention and removal	U. S. 2,235,944
Oil, Lubricating	99-99.5%	Polycarboxylic Acid	Internal combustion engines	U. S. 2,124,628
Oil, Paraffin	60-200 parts	Fatty Acids 2 parts; Litharge 1 part	General	U. S. 1,364,134
Oil, Paraffin Base		Camphor Dissolved in Alcohol and Alum in Water	General	Can. 182,859
Oil, Seal	18 parts	Graphite 33 parts; Horsefat 7.5 parts Zinc White 7.5 parts; Grease (Solid Tallow with Ca or Al Soap)	Lubricant and rust preventive	Brit. 241,678
Peroxide, Sodium (reaction with wood alcohol)		Plus Lubricating Oil	Corrosion preventing Top lube oil	U. S. 2,054,721 and French 778,792
Peroxide, Tetralin	0.1% or more	Petroleum Oil	Copper	U. S. 2,249,340
Phosphate, Calcium precipitated)		Oil		U. S. 1,367,597
Phosphites, Alkyl		and Lubricating Oil	Special alloy bearings	U. S. 2,084,270
Phosphites, Aryl		Lubricating Oil	Special alloy bearings	French 811,568
Pitch (from Oils and Fats)	30-40 parts	60-70 Parts Tar Distillate or Hydrocarbon Solvents (See also U. S. 1,379,019 which includes TiO_2		U. S. 1,379,018
Sulphur	0.1-0.5%	Plus Lubricating Oil	Special bearings	U. S. 2,222,431
Tar Oil	68 parts	Asphaltum 20 parts; Stearin Pitch 12 parts	Iron or steel	U. S. 1,328,282
Thiourea (condensation of Thiourea and Mustard Oil) etc.		Lubricating Oil		U. S. 2,220,970
Urethan-cyclic				U. S. 2,215,038
Zinc		Semi-Solid Mixtures of Paraffin or Olefin Grease	Steel ropes in acid water	Brit. 192,179

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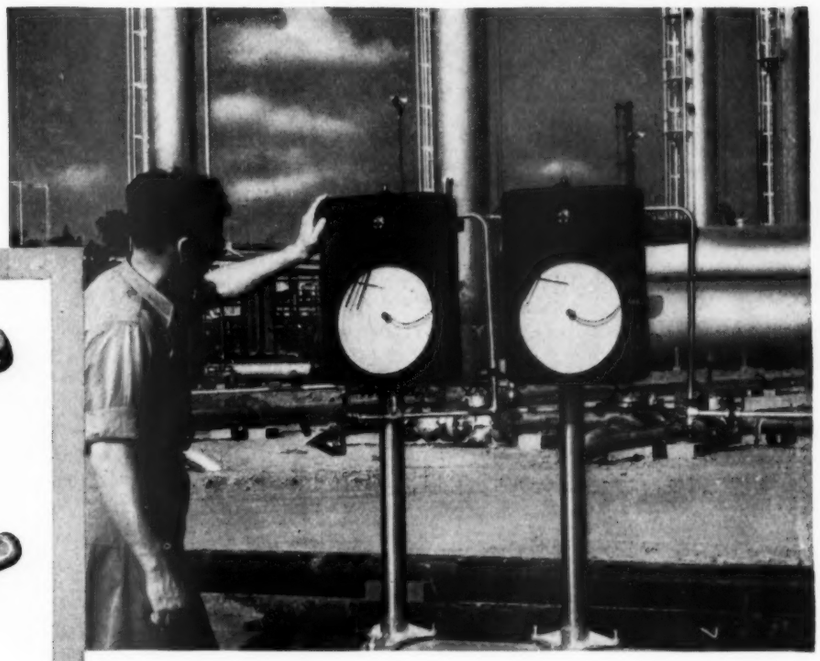

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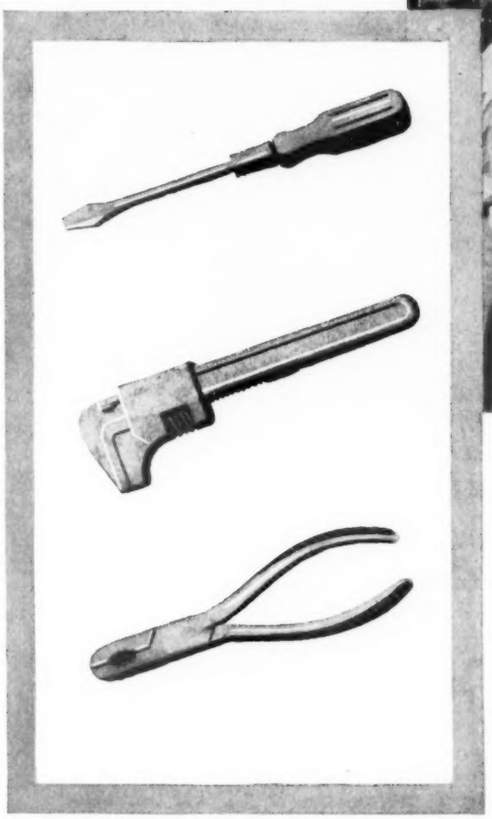

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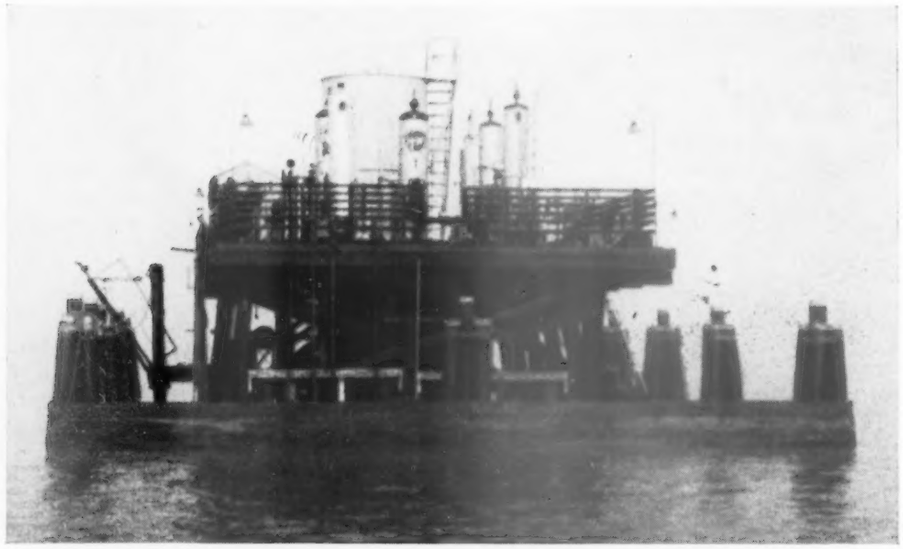

Fig. 3—Marine oil drilling rig several miles from shore was the site of tests conducted by an oil company on marine slushing coatings

vertically for application of the 2 different combinations on the same section. (Fig. 4.)

The walkway near the panels was used for a position from which to observe the results and to manipulate the panels. The effect of the variation of the tides was intended to resemble the action of water on boats covered with slushing compounds. Considerable corrosion took place during the 200 days' exposure. (Fig. 5.) Much information may be secured from such a test, but it should be noted that this test is not conducted exactly under the same conditions as would be experienced by a boat operating in the same waters. The tests should be conducted through all seasons to approximate actual conditions.

Accelerated Corrosion and Adhesion Tests

The Humidifier Test: Slushing compounds are generally evaluated by accelerated tests designed to be comparable to actual service conditions. Of these, the humidifier and fresh water spray tests are most commonly used.

A simple low-cost humidifier apparatus is illustrated in Fig. 6 and its construction shown in Fig. 7. The humidifier cabinet is made of a porcelain-lined, 3-door used refrigerator in which 100% relative humidity and 100°F. temperature are maintained. Air is bubbled through distilled water at the rate required by vendor's specifications, which is usually 2 complete air changes per hour. This represents 16 cu. ft. per hour for the box illustrated. A portion of the apparatus is shown cut away to show the details of construction. Constant level is maintained by a syphon from a bottle of distilled water on top of the cabinet. A 150-watt incandescent lamp immersed in the water is used to warm it. The temperature is controlled by a simple thermoregulator like the one shown in the picture. Observation of the temperature and humidity was made from a hygrometer in upper left portion of the box. The readings were visible from the glass door. The specimens were suspended from the glass hooks at the right of the cabinet. The size and type of panels used varied with the requirements specified by the purchaser. Sandblasted blue annealed panels 2 in. x 4 in. x $\frac{1}{8}$ in. have been found satisfactory in a number of tests.

After application of the slushing coatings, the panels are allowed to remain overnight to render them drip-free and then placed in the cabinet. The humidifier described should be well insulated, otherwise it will have a tendency to swell.

Humidifier evaluation tests are required in a number of government specifications. For example, Army Specification 2-84B, Compound Rust Preventive, Light, requires that 2 in. x 3 in. x 18 in. clean and polished plates with rounded edges made from cold rolled steel shall be polished, washed with wood alcohol, rinsed with neutral absolute alcohol, dried in a desiccator and dipped in the slushing compound at a maximum temperature of 150°F. to give the film thickness of 0.015 in. The panels should then be drained while suspended in a vertical position. The plates are maintained for 5 hours at 120-124°F. and allowed to hang at room temperature for 24 hours. Finally the plates are suspended by means of glass hooks in a humidity cabinet, at 100% relative humidity at 100°F., in which the air is changed from 2 to 2½ times each hour. To pass the test the slushing compound should not show any corrosion for 300 hours.

The Fresh Water Spray: The fresh water

Table 7—Additional Accelerated Corrosion Tests

Title of Test	Specification in which used	Remarks
Salt water immersion	AXS-674	3½% salt solution at 70-80° F.
Combination salt water spray and weathering	14-C-4d	3% salt solution first day, weathering 5-60 days.
Ultraviolet rays	2-82-C	Ultraviolet rays 5 hours each day for 7 days.
Inverted watch glass	2-84-B	Partially coated steel plate covered with inverted watch glass and allowed to remain for 10 days.
Acid vapor test	.....	Steel coated plates coated with compound suspended over specified acid vapor which may or may not be heated.
Accelerated burial test	.....	Only for underground coatings. Steel panels placed in pit for specified period in which sandy loam containing 1% salt is mixed.

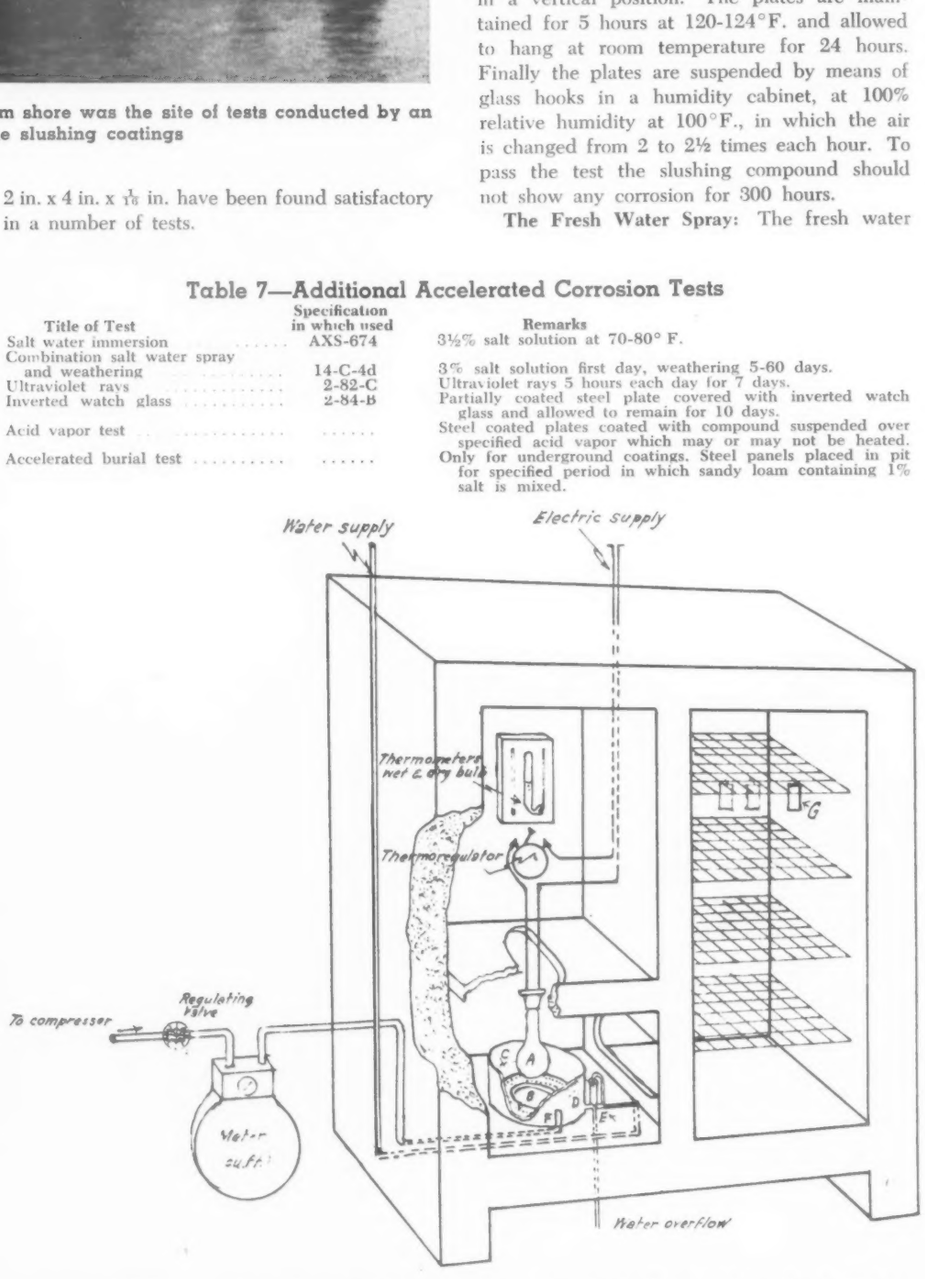

Fig. 7—Arrangement of humidifier cabinet. Dimensions were: Height 44 in., depth 20.5 in., inside depth 17 in. A—150-watt incandescent lamp: B—air release (perforated ring water sprinkler). C—water level. D—water container. E—water level regulator. F—air line to perforated ring. G—test panels 2 in. x 4 in.

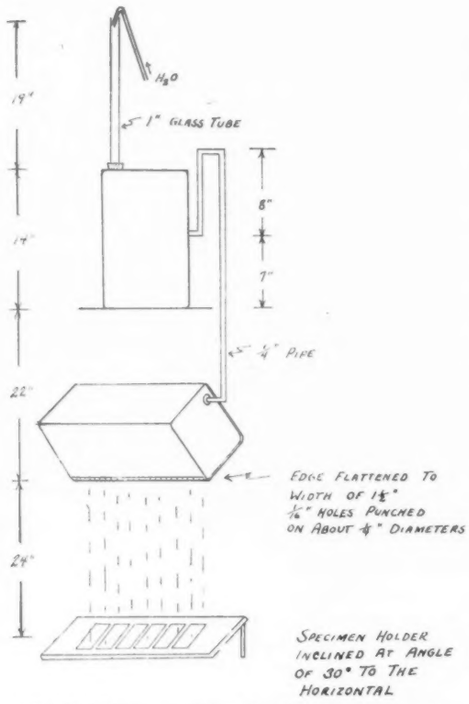

Fig. 8—Arrangement of fresh water spray apparatus for conducting accelerated corrosion and adhesion tests on slushing type rust preventive compounds

spray test is one of the 2 most popular accelerated corrosion and adhesion tests. A simple fresh water spray apparatus is illustrated in Fig. 8. This apparatus was adapted from U. S. Navy Specification 14-C-d. As is illustrated, water is dropped on the coating under test from a height of 2 ft. intermittently, 3 min. on and 3 min. off, for a period of 5 hours. The water impinges the panel at an angle of 30 degrees. The panels are made of polished steel 4 in. x 6 in. x ⅛ in. The compound is applied to the panels at 158°F. and then maintained at 113-122F. for 48 hours. Although 5 hours of the intermittent shower is required by the 14-C-d test, many commercial slushing compounds exceed this requirement many times. This test is applied only to the heavier coatings which should withstand the scouring action of the intermittent shower. Some additional corrosion tests not described above are tabulated in Table No. 7.

Miscellaneous Physical and Chemical Tests: Besides the performance, weather and accelerated corrosion and adhesion tests, a number of physical and chemical tests are usually conducted on slushing type rust preventives. Some of the physical tests are drying, erosion, and film thickness. Among the chemical tests are mineral acid, pigment content, and soluble chromate content.

Some purchasers of slushing coatings also require that the coating adhere to metal surfaces in vertical position at a designated temperature for five days or more. A more severe adhesion requirement is the Slick Test in which a coated stirrer is rotated at 1500 rpm for 3 min. in 4% salt solution at 100°F. Finally, another test for some slushing compounds is the determination of whether the compound will neutralize acid solution (0.1% HBr, aqueous) after 4 hours, for example, AXS-674, oil, lubricating preservative, medium.

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E—"Protective Coatings for Metals", Burns and Schuh; Monograph No. 79, American Chemical Society.

F—"Corrosion of Iron and Steel", Hudson.

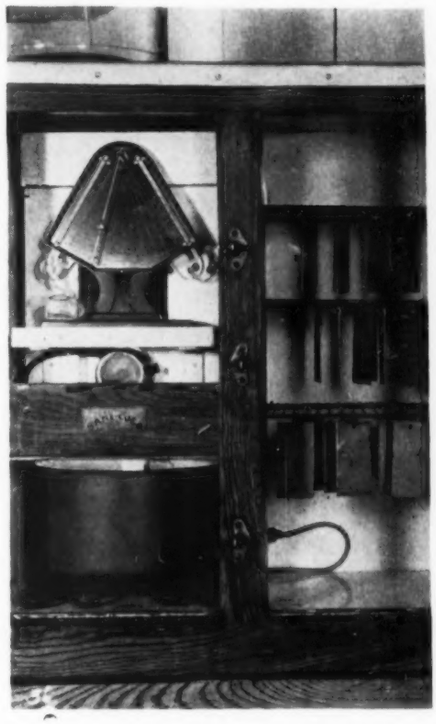


Fig. 6—Interior of low-cost humidifier cabinet designed for evaluating slushing compounds under accelerated conditions comparable to those of actual service

G—"Pipe Corrosion and Coatings", Larsen.

H—Bibliography of Corrosion, Nathan Van Patten; Queen's University Library, Ont., Can.

I—Bibliography on Corrosion-Protective Coatings; American Documentation Institute, Washington, D. C.

J—Tests on Protective and Decorative Coatings, reports of tests, American Society for Testing Materials, Philadelphia.

K—Survey of Rust Preventives, S. L. Bishkin, 1939, 165 pages, private circulation.

Fig. 5—Panel after 200 days' exposure

Fig. 4—Panels of hot roll steel plates in place for test on rust preventive coatings exposed to salt air and salt water. Results were observed and the panels manipulated from the walkway

The Analysis of Hydrocarbon Gases By Adsorption Fractionation*

By Nelson C. Turner**

A new potential method is described for the analysis of the light hydrocarbons which are being utilized in increasing quantities in modern refining processes for the manufacture of new products. The method is by adsorption fractionation. The separation of the individual hydrocarbons is effected by taking advantage of the difference in composition of adsorbed and unadsorbed phases existing in equilibrium in a system with activated charcoal as the adsorbing medium.

THE rapid technological advance in recent years of the natural gasoline and other industries working with light hydrocarbons has brought with it an increased demand for more precise methods of analysis of these light hydrocarbon mixtures.

Present methods of analysis rely almost entirely on low temperature fractionation which requires, in order to obtain reproducible results, a highly skilled operating technique which is not available in every laboratory. Furthermore, low temperature fractionation requires as a cooling medium either liquid air or liquid nitrogen which is not easily obtained in many sections of the country. It was these difficulties which prompted this investigation of another potential method of light hydrocarbon analysis.

An analysis of this type can logically be separated into three different steps, which are more or less independent. The first and probably the most complex is that of the separation of the mixture into its individual components. The second step is the identification of those components by measuring some characteristic physical property. The third step is the measurement of the quantity of each component.

Separation

The separation of hydrocarbons is most commonly accomplished by means of fractional distillation, that is, the sample is liquefied and then distilled in a fractionating column. Reflux in the column is obtained by condensing a portion of the overhead product with some low temperature cooling medium such as liquid air or liquid nitrogen.

Generally speaking the separation of the components of a mixture by means of fractional distillation depends upon the fundamental requirement that at any point in the system where two phases are in equilibrium the composition of one phase must differ from the other. In the ordinary fractional distillation processes one of these phases is a liquid and the other a vapor, but separation by fractionation is not necessarily restricted to processes involving only vapor-liquid equilibrium. Separation is at least theoretically possible when any two phases in equilibrium differ in composition. For example let us consider the equilibrium existing in a system containing two or more hydrocarbons and activated charcoal. We have here what we may call an adsorbed phase whose composition differs markedly from the unadsorbed phase with which is is in equilibrium. It should, therefore, be possible by some means or other to take advantage of this difference in composition of the adsorbed and unadsorbed phase to effect a complete separation of the hydrocarbon components of the system.

Using this principle we can, mentally at least, conceive of a fractionating device perfectly analogous to the conventional liquid-vapor type fractionating column: If instead of condensing the reflux we had absorbed the overhead vapor in activated charcoal, we could return the charcoal to the top of the column; by some purely hypothetical means it then could be made to flow down through the column, maintaining equilibrium with the ascending vapors. The reboiler in the column instead of merely boiling liquid would be used to drive all of the adsorbed material from the charcoal, which could be then ejected from the base of the column. The actual mechanical difficulties in carrying out such a process are obvious.

We have, however, been successful in utilizing this principle in an apparatus which differs considerably from the conventional fractionating column in actual physical arrangement. The fundamental difference lies in the fact that we make no attempt to mechanically move the charcoal, but shift the mass of hydrocarbons and the means of heating instead. This is illustrated in Fig. 1 which shows diagrammatically four stages in the process of separation of a two-component mixture, such as for example methane and ethane.

Stage 1 shows the approximate distribution of the two components immediately after being introduced into the bottom of the column. The methane is represented by a means of

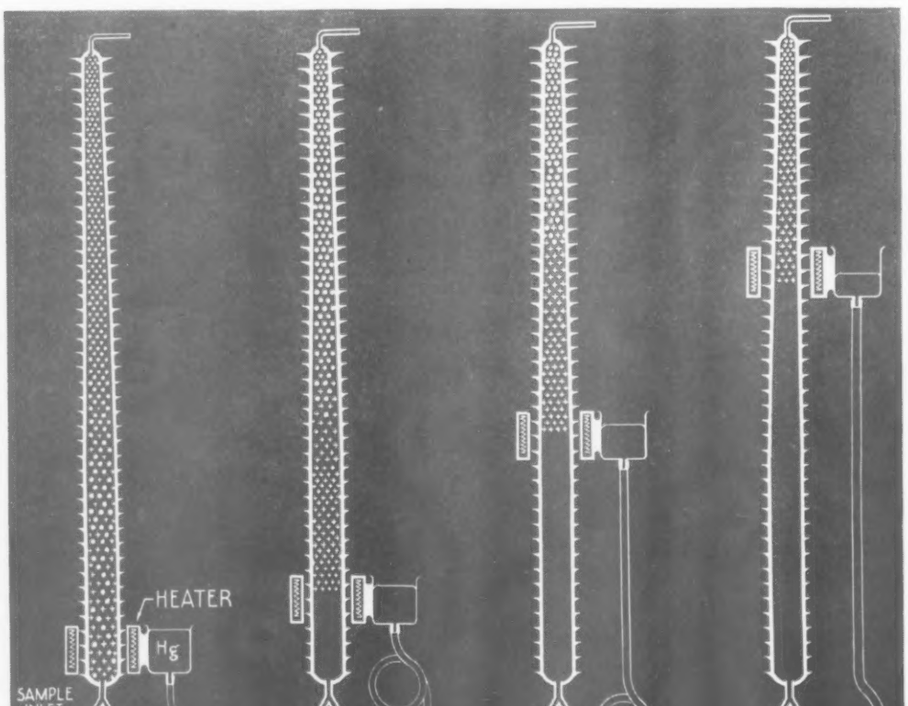


Fig. 1—Various stages in the separation of gases by adsorption fractionation

*Presented before 22nd Annual Convention, Natural Gasoline Assn. of America, Dallas, April 14-16.

**Engineering and Construction Division, Frick-Reid Supply Corp.

circular symbols and the ethane by means of crosses. It will be noted that the methane has penetrated through to the top of the column while the ethane has not penetrated more than half way up. Methane is present throughout the entire length of the column but decreases somewhat in concentration in the lower section. The ethane increases in concentration somewhat near the bottom of the column, but does not exist in a pure state at any point.

Stage 2 shows the changes in composition at various levels when heat has been applied at the base. The whole body of hydrocarbons has been driven up the column a short distance. If we consider only the relative change in position of the hydrocarbon body and the charcoal bed, we may see that the upper portion of the column, which contained only charcoal saturated with methane, is available as reflux and this reflux is moving downward relative to the position of the heater and the zone of hydrocarbons containing both components. It will also be noted that this zone which is common to both components has narrowed somewhat and an area containing pure ethane has appeared just above the heater.

Stage 3 shows the separation at a still more advanced state. Attention should be called to the mercury reservoir attached to the heater, which allows a column of mercury to flow into the column and fill all space below the heater to prevent any down-flow and readsorption of the gases.

Stage 4 shows practically complete separation between the methane and ethane. The zone containing both components has narrowed into insignificance and as the heater continues to progress up the column a well defined break point will occur when the ethane reaches the top.

For purpose of clarity the actual portions of the column as shown in Fig. No. 1 are considerably altered. The actual column is approximately 6 ft. long. The inside diameter at the bottom is approximately ¾ in. and the column is tapered to an inside diameter of approximately 3/16 in. at the top. We have found that this tapering considerably increases the sharpness of separation, due apparently to the fact that the zone between two adjacent components, which contains both components, reaches a small but finite minimum thickness which is independent of the diameter of the column. Thus, by gradually reducing the diameter of the column we are able to reduce the total quantity of components which still remains as a mixture. This quantity is negligible when expressed as a percentage of the components being separated.

The circumferential fins shown on the column in Fig. 1 all have the same outside diameter and these fins serve two purposes. First, they increase the rate of heat transfer between the heater and the column and, second, they serve as a seal between the heater and the column, which prevents convection air currents from passing up between the heater and the column which would tend to heat the column for a considerable distance above the heater. We have found that the sharpest separation is obtained when the zone of heating is highly localized.

For simplicity, we have confined the discussion so far to the separation of two components. However, we have encountered no difficulty in separating the components of a gas sample containing all of the paraffin hydrocarbons up to and including hexane. Well defined break points occur between iso and normal butane, as well as between iso and normal pentane. The general principle of separation does not differ from that described for the two component separation. As the sample is driven up through the charcoal bed, the hydrocarbons tend to divide themselves into bands, each band containing a single component. The order of separation is with few exceptions the same as the order in which the separation would be if made by liquid-vapor fractionation.

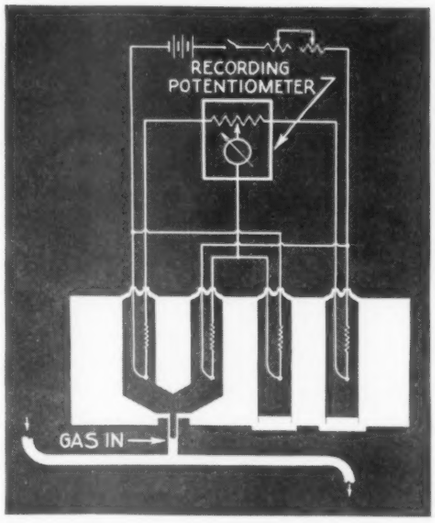


Fig. 2—Diagram of thermal conductivity cell. Various hydrocarbons are identified as they come off the fractionating column by measuring their thermal conductivity

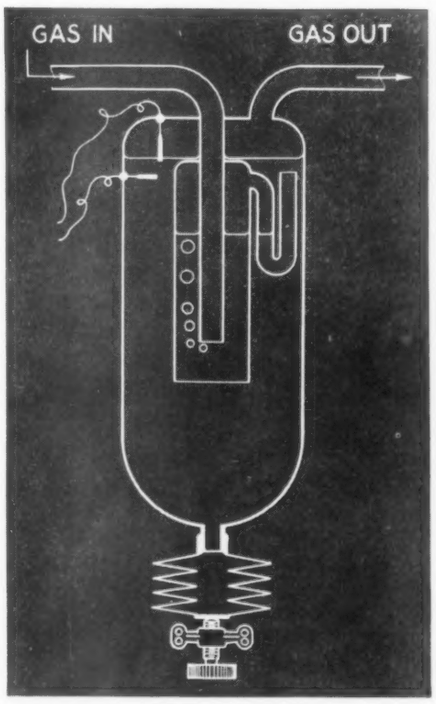


Fig. 3—Diagram of "Volumeter" for quantitative measurement of the gas stream

Identification

Since at no time during the process of separation do we have the lighter hydrocarbons in a true liquid state, we are unable to measure their boiling point and hence cannot use this physical property as a means of identifying various hydrocarbons as they come off the column. We are thus forced to seek some other readily determined physical property which is characteristic of each individual hydrocarbon to be used as a means of identification. For this purpose we have found that thermal conductivity is quite satisfactory and this property is rather easily measured and is readily adaptable to automatic recording.

The general arrangement of the thermal conductivity cell is shown in Fig. 2. The cell consists of four small chambers, each containing a platinum resistance wire. Two of the chambers are filled with air which serves as a standard of comparison. The other two chambers contain the gas whose thermal conductivity is to be measured. The gas from the column does not pass directly through these chambers since inevitable variations in the rate of gas flow produces erroneous results in the measurement of thermal conductivity. One end of each chamber is connected into the main gas stream and the change of gas in the cell chambers is dependent entirely upon diffusion. The electrical hook-up of the four resistance wires follows the Wheatstone bridge arrangement as shown. The balancing of the circuit is accomplished by means of a standard recording potentiometer, thus when the thermal conductivity of the gas in the two chambers changes the resistance wires change in temperature and consequently in resistance. This throws the circuit out of balance which is automatically restored by the potentiometer.

The position of potentiometer is recorded continuously on a strip chart. A different reading is obtained on the potentiometer for each hydrocarbon passing through the thermal conductivity cell. The clock mechanism ordinarily used to drive a recording potentiometer has been removed and a chart driving mechanism has been substituted, which controls the chart movement as a function of a volume of the gas coming from the top of the column. This chart drive will be described in more detail further on in this paper. The gas chambers of the thermal conductivity cell are provided with a manually operated valve arrangement so that air can be introduced into these two chambers as a means of periodically checking the calibration of the thermal conductivity measuring system.

Quantitative Measurement

The gas stream after leaving the thermal conductivity cell passes into the metering device illustrated in Fig. 3. This "volumeter" consists essentially of a glass bell inverted under water contained in a larger glass cylinder. Gas enters the bell through the center tube and collects in the top, depressing the

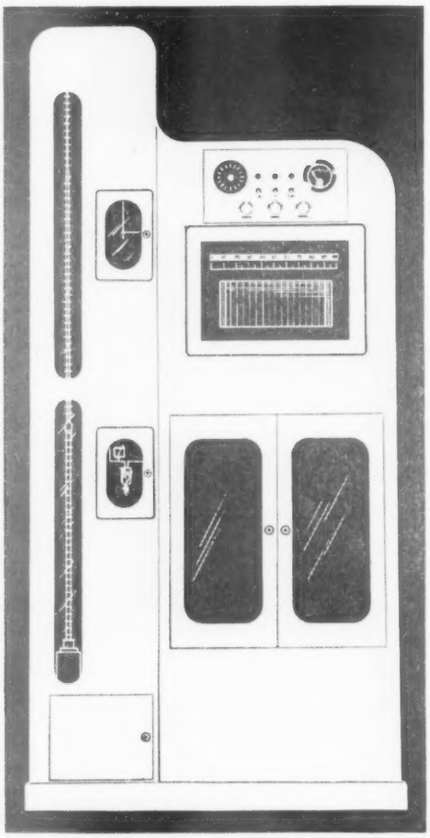


Fig. 5—Front view of assembled apparatus

water in the bell and also in the inverted syphon side-arm attached to the top of the bell. When the water level is depressed to the bottom of the inverted syphon side-arm, gas breaks through and discharges into the outer cylinder. The water level in the bell is then restored to its original position near the top.

Each time the bell discharges, the water level in the outer cylinder changes slightly and breaks an electrical contact between the water and an electrode fused into the outer cylinder. The interruption of this electrical circuit, operating through a relay, energizes a solenoid operated ratchet in the recording potentiometer moving the chart one increment. The increment of measurement between each large portion of the methane line has been taken out in order to make a cut of more printable proportions. The small plateaus are caused by the intermittent movement of the chart due to the fact that the volumeter measures the gas increments of about 4 ml. The discharge of the bell is approximately 4 ml. The device has been checked against known volumes of gas and an accuracy greater than one-fourth of one per cent is consistently obtained. The accuracy of the apparatus is not impaired by variations of the rate of flow between 0 and 30 ml. per minute.

Table 1—Check Analysis of Two Types of Hydrocarbon Mixtures Showing Deviation

Dry Natural Gas

	Sample No. 1			Sample No. 2		
	1st Run	2nd Run	Dev.	1st Run	2nd Run	Dev.
CH_4	86.39	86.45	0.08	86.70	86.81	0.11
C_2H_6	9.00	8.93	0.07	8.83	8.75	0.08
C_3H_8	3.26	3.29	0.03	3.14	3.12	0.02
C_4H_{10}	1.24	1.23	0.01	1.21	1.20	0.01
C_5H_{12}	0.11	0.10	0.01	0.12	0.12	0.00
	100.00	100.00	Av. 0.036	100.00	100.00	Av. 0.024

Commercial Butane

	Sample No. 3			Sample No. 4		
	1st Run	2nd Run	Dev.	1st Run	2nd Run	Dev.
C_3H_8	4.69	4.73	0.04	4.34	4.41	0.07
I—C_4H_{10}	22.17	21.48	0.69	20.76	21.14	0.38
N—C_4H_{10}	71.11	71.64	0.53	72.84	72.43	0.41
C_5H_{12}	2.03	2.15	0.12	2.08	2.02	0.04
	100.00	100.00	Av. 0.34	100.00	100.00	Av. 0.22

Operations

A simplified flow diagram of the entire apparatus is shown in Fig. 4 and a pictorial assembly drawing is shown in Fig. 5. The sample of gas is introduced through the flow meter into the bottom of the column. The flow meter is used to estimate the quantity of sample taken. The best quantity to use depends somewhat on the nature of the gas, ordinary dry natural gas requires about a five-liter sample. After the sample is introduced, the sampling stop-cock is closed and the one leading to the mercury reservoir is opened. A single switch on the panel board starts the operation which from this point is fully automatic. The pulling of the switch turns on the heater which remains stationary until the temperature reaches 750° F. At this point the elevating mechanism goes into operation and the heater gradually rises at a predetermined rate which was set on the instrument panel before the apparatus was put into operation. This rate is such that the heater travels the entire length of the column in a period of about 8 hours. On reaching the top of the column the heater remains stationary for 20 minutes, during which time hydrogen is introduced in the top of the column to act as a purge for the thermal conductivity cell, volumeter and connecting tubing. At the end of this time the heater returns to the bottom of the column at an accelerated rate. Also, the mercury level in the column returns to the bottom. Hydrogen follows the receding mercury and is present in the column when the next sample is charged in.

This hydrogen is generated in a small electrolytic cell incorporated as part of the apparatus and derives its energy from rectified 110 volt AC current. Gas leaving the top of the column during the distilling period first passes through a small graduated condensate separator. This separator together with the thermal conductivity cell and volumeter are all enclosed in a thermostatically and controlled air bath held at 104° F. At this temperature all hydrocarbons lighter than hexane pass through the system as vapors and are

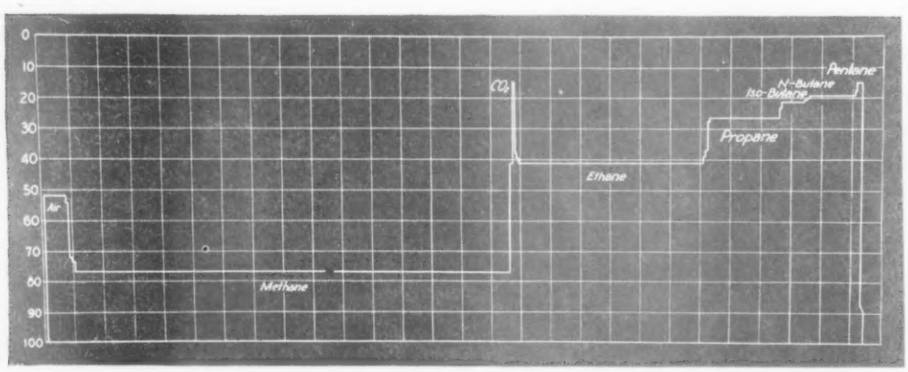


Fig. 6—Typical thermal conductivity vs volume chart. (Methane line has been considerably shortened)

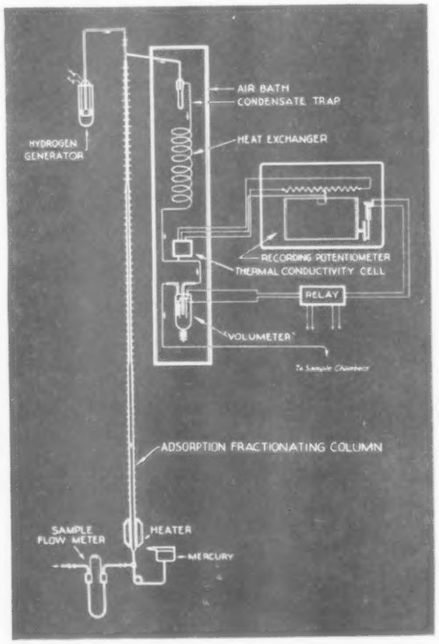


Fig. 4—Simplified flow diagram of the adsorption fractionation apparatus

measured as such. Hexane and heavier hydrocarbons collect in the condensate separator where they are measured as a liquid. The coiled tubing between the condensate separator and the thermal conductivity cell serves as a heat exchanger bringing the gas from the column to the same temperature as the air bath, thus assuring a constant temperature of the gas entering the thermal conductivity cell.

Fig. 6 is a copy of a complete chart recorded from the analysis of dry natural gas. A passage of each increment from the volumeter trips the chart driving mechanism causing it to move up a small but definite distance.

We are tabulating below a list of hydrocarbons which we have included so far in samples to the column. Those hydrocarbons shown in brackets represent groups where we were unable to obtain any apparent separation or where separation was too indefinite to be of quantitative value.

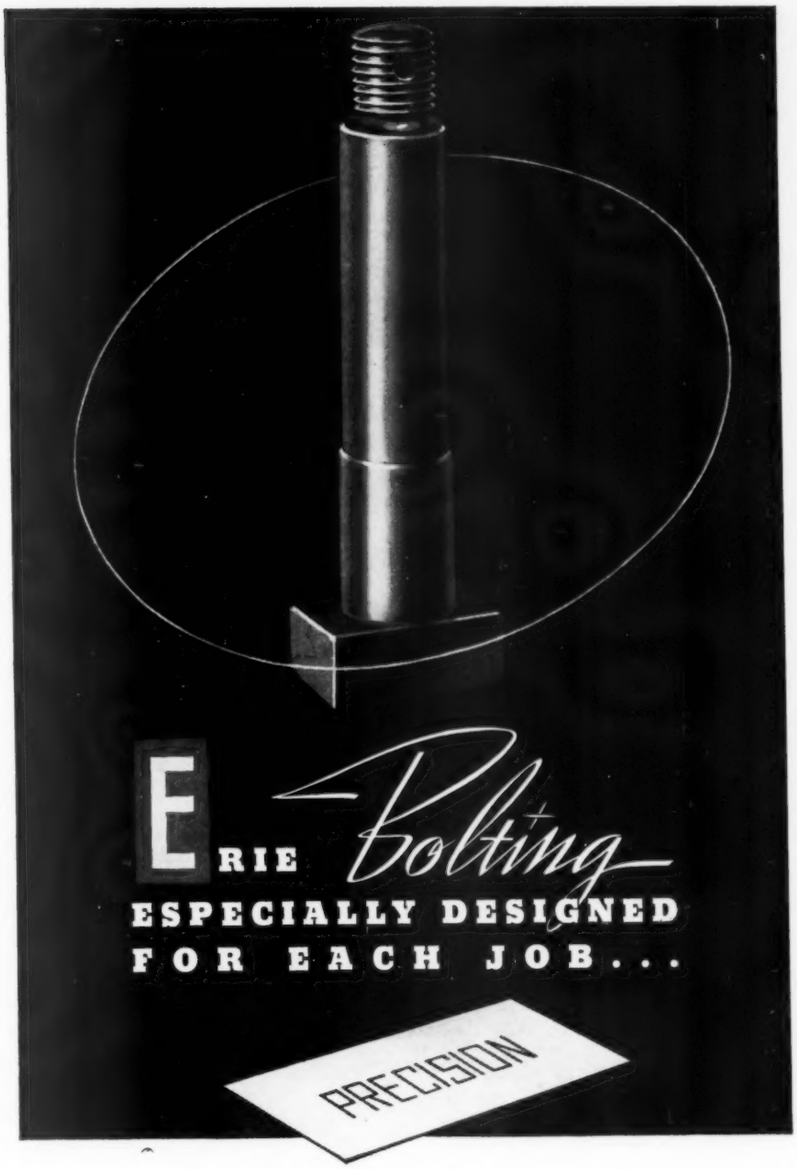
Air	n-Butane
Methane	iso-Butane 1-Butylene
Carbon Dioxide	2-Butylene
Ethylene	Butadiene
Ethane	iso-Pentane
Propane	n-Pentane
Propylene	Hexane
Iso-Butane	

Table 1 shows a series of analyses in which check runs were made on identical samples. It will be noted that the maximum deviation in percentage of one component does not differ in the check analysis more than 0.69%. The average deviation for all analyses shown is 0.155%.

The work thus far has been largely confined to mixtures of hydrocarbons containing nothing heavier than hexane. Analysis of mixtures containing known quantities of hexane have demonstrated that this hydrocarbon can be adsorbed in the column and quantitatively recovered in the distillation. Similar runs made with samples containing known quantities of heptane and heavier hydrocarbons show that these heavier hydrocarbons cannot always be completely distilled from the column. The charcoal used in all of these, however, was full 40-minute activity. Preliminary experiments indicate that the retentivity of the charcoal can be reduced by the deposition of salt on capillary surface of the carbon so that hydrocarbons as heavy as decane can be quantitatively removed. The work on this phase of the problem is still in progress and it is too early to draw any final conclusions, but the results so far indicate that we will have no difficulty in handling mixtures containing hydrocarbons as heavy as decane. The highest boiling hydrocarbons which can at present be actually separated are pentane and hexane. Thus, hexane and heavier hydrocarbons will be determined as a single group.

Acknowledgment

The writer wishes to acknowledge the assistance of Mr. Lloyd V. Guild, of the Burrell Technical Supply Co., Pittsburgh, who has played an important part in the development of many details of the apparatus, particularly in connection with the volumeter and thermal conductivity cell.



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Wartime Standards for Screw Threads For High-Temperature Bolting

WARTIME standards for dimensions and tolerances for straight screw threads for high-temperature bolting, applicable in refinery and gasoline plant service, have been issued by the American Standards Assn. upon request of the War Production Board.°

It had been found increasingly necessary by designers and engineers, in using high-temperature bolting, to provide an allowance or neutral zone between the minimum nut and maximum screw. The allowance given in Class I fit, in the American Standard B1.1-1935°°, was not found suitable for high-temperature service. A new A.S.A. subcommittee on Screw Threads for High-Temperature Bolting was appointed late in 1941 and drafted a proposed standard for the limiting thread dimensions that would give a satisfactory fit in this service. This standard was based on the combination of screws made to Class 3 tolerances and nuts made to Class 2 tolerances, according to American Standard B1.1-1935.

At the request of WPB, the A.S.A. War Standards Procedure was applied to emergency development of this standard and the draft was submitted to more than 40 key individuals experienced with these materials in various industries. Changes were made in accordance with their suggestions and the revised draft approved as an American War Standard, Nov. 6, 1942. Representatives of the oil industry on the A.S.A. subcommittee on Screw Threads for High-Temperature Bolting were L. D. Burritt, Elizabeth, N. J., Standard Oil Development Co., and D. B. Rossheim, New York, M. W. Kellogg Co., refinery engineers.

The introductory notes from the A.S.A. Bulletin B1.4-1942 and the 2 tables giving limiting dimensions and tolerances for threads on screws and nuts for high-temperature bolting are given below:

"**General.** This standard covers the limiting dimensions and tolerances for screw threads on high-temperature bolting for use with pressure vessels and steel flanges, fittings, and valves.°°° The lead of the threads and the limiting dimensions of their major, minor, and pitch diameters are based on the requirements of industry as reflected by the experience of both users and producers of threaded products.

"**Form of Thread.** The form of the thread profile as specified here is known as the American National Form of Thread. It is described in the American Standard, Screw Threads for Bolts, Nuts, Machine Screws and Threaded Parts, B1.1-1935.

"**Screw Thread Series.** For sizes 1 in. and smaller, the American Standard Coarse Thread Series is used and for larger sizes, the American Standard 8-Pitch Thread Series. Both series are given in the American Standard B1.1-1935.

"**Definitions.** The definitions of the terms used in this standard are given in the American Standard B1.1-1935.

"**Detail Specifications.** To facilitate assembly of the threaded parts and reduce the possibility of seizure of the threads, this standard provides an allowance or neutral zone between the minimum nut and the maximum screw. This allowance is obtained by making the maximum pitch diameter of the screw smaller than the minimum pitch diameter of the nut by an amount equal to the difference between the Class 2 and 3 tolerances specified in the American Standard B1.1-1935, for the nominal diameter concerned. The screw has been given a Class 3 tolerance so that the minimum pitch diameter of the screw is equal to the minimum pitch diameter of a Class 2 screw according to B1.1-1935.

"In conformance with American Standard practice, the basic nut has been retained, the allowance being taken exclusively from the screw. Class 2 tolerances have been adopted for the nuts. All nut dimensions given in this standard are in agreement with those given in the American Standard B1.1-1935, for Class 2 product.

"Pitch diameter tolerances are cumulative and include lead and angle variations. They are based on a length of engagement of 1 X major diameter for sizes 1 to 3 ins., inclusive, and a length of engagement of 3 ins., for sizes over 3 ins.

"The maximum major diameter of the screw is below basic by an amount equal to the allowance. The tolerance on the major diameter is the same as the Class 3 tolerance specified in the American Standard B1.1-1935.

"The maximum minor diameter of the screw is smaller than the Class 2 dimension specified in B1.1-1935, by an amount equal to the allowance."

°American War Standard B1.4-1942, "Straight Screw Threads for High-Temperature Bolting", published by American Standards Assn., 29 W. 39th St., New York, price 25c.

°°American Standards Assn. Bulletin B1.1-1935, published April, 1935.

°°°For the specification of the bolting *material*, the standard covering the service for which the bolting is intended should be referred to, such as the American Standard for Steel Flanges and Flanged Fittings, B16c-1939.

Straight Screw Threads for High-Temperature Bolting
(For Use with Pressure Vessels and Steel Flangs, Fittings, and Valves)

Table 1. Limiting Dimensions and Tolerances for Threads on Screws

Sizes	Threads per Inch	Basic Major Diameter	Allowance Minus	Major Diameter			Pitch Diameter			Minor Diameter Max
				Max	Min	Tolerance	Max	Min	Tolerance[1]	
1/4	20	0.2500	0.0010	0.2490	0.2418	0.0072	0.2165	0.2139	0.0026	0.1877
5/16	18	0.3125	0.0011	0.3114	0.3032	0.0082	0.2753	0.2723	0.0030	0.2432
3/8	16	0.3750	0.0013	0.3737	0.3647	0.0090	0.3331	0.3299	0.0032	0.2970
7/16	14	0.4375	0.0013	0.4362	0.4264	0.0098	0.3898	0.3862	0.0036	0.3486
1/2	13	0.5000	0.0015	0.4985	0.4881	0.0104	0.4485	0.4448	0.0037	0.4041
9/16	12	0.5625	0.0016	0.5609	0.5497	0.0112	0.5068	0.5028	0.0040	0.4587
5/8	11	0.6250	0.0017	0.6233	0.6115	0.0118	0.5643	0.5601	0.0042	0.5118
3/4	10	0.7500	0.0019	0.7481	0.7353	0.0128	0.6831	0.6786	0.0045	0.6254
7/8	9	0.8750	0.0021	0.8729	0.8589	0.0140	0.8007	0.7958	0.0049	0.7366
1	8	1.0000	0.0022	0.9978	0.9826	0.0152	0.9166	0.9112	0.0054	0.8444
1 1/8	8	1.1250	0.0024	1.1226	1.1074	0.0152	1.0414	1.0359	0.0055	0.9692
1 1/4	8	1.2500	0.0025	1.2475	1.2323	0.0152	1.1663	1.1605	0.0058	1.0941
1 3/8	8	1.3750	0.0025	1.3725	1.3573	0.0152	1.2913	1.2852	0.0061	1.2191
1 1/2	8	1.5000	0.0027	1.4973	1.4821	0.0152	1.4161	1.4098	0.0063	1.3439
1 5/8	8	1.6250	0.0028	1.6222	1.6070	0.0152	1.5410	1.5345	0.0065	1.4688
1 3/4	8	1.7500	0.0029	1.7471	1.7319	0.0152	1.6659	1.6591	0.0068	1.5937
1 7/8	8	1.8750	0.0030	1.8720	1.8568	0.0152	1.7908	1.7838	0.0070	1.7186
2	8	2.0000	0.0031	1.9969	1.9817	0.0152	1.9157	1.9084	0.0073	1.8435
2 1/8	8	2.1250	0.0032	2.1218	2.1066	0.0152	2.0406	2.0331	0.0075	1.9684
2 1/4	8	2.2500	0.0033	2.2467	2.2315	0.0152	2.1655	2.1578	0.0077	2.0933
2 1/2	8	2.5000	0.0035	2.4965	2.4813	0.0152	2.4153	2.4071	0.0082	2.3431
2 3/4	8	2.7500	0.0037	2.7463	2.7311	0.0152	2.6651	2.6564	0.0087	2.5929
3	8	3.0000	0.0038	2.9962	2.9810	0.0152	2.9150	2.9058	0.0092	2.8428
3 1/4	8	3.2500	0.0039	3.2461	3.2309	0.0152	3.1649	3.1556	0.0093	3.0927
3 1/2	8	3.5000	0.0040	3.4960	3.4808	0.0152	3.4148	3.4055	0.0093	3.3426

All dimensions are given in inches.
The American National Form of thread shall be used.
[1] Pitch diameter tolerances include errors of lead and angle.
[2] The maximum pitch diameters of screws are smaller than the minimum pitch diameters of nuts by these amounts.

Straight Screw Threads for High-Temperature Bolting
(For Use with Pressure Vessels and Steel Pipe Flanges, Fittings, and Valves)

Table 2. Limiting Dimensions and Tolerances for Threads on Nuts

Sizes	Threads per Inch	Minor Diameter			Pitch Diameter			Major Diameter Min
		Max	Min	Tolerance	Max	Min	Tolerance[1]	
1/4	20	0.2060	0.1959	0.0101	0.2211	0.2175	0.0036	0.2500
5/16	18	0.2630	0.2524	0.0106	0.2805	0.2764	0.0041	0.3125
3/8	16	0.3184	0.3073	0.0111	0.3389	0.3344	0.0045	0.3750
7/16	14	0.3721	0.3602	0.0119	0.3960	0.3911	0.0049	0.4375
1/2	13	0.4290	0.4167	0.0123	0.4552	0.4500	0.0052	0.5000
9/16	12	0.4850	0.4723	0.0127	0.5140	0.5084	0.0056	0.5625
5/8	11	0.5397	0.5266	0.0131	0.5719	0.5660	0.0059	0.6250
3/4	10	0.6553	0.6417	0.0136	0.6914	0.6850	0.0064	0.7500
7/8	9	0.7689	0.7547	0.0142	0.8098	0.8028	0.0070	0.8750
1	8	0.8795	0.8647	0.0148	0.9264	0.9188	0.0076	1.0000
1 1/8	8	1.0045	0.9897	0.0148	1.0517	1.0438	0.0079	1.1250
1 1/4	8	1.1295	1.1147	0.0148	1.1771	1.1688	0.0083	1.2500
1 3/8	8	1.2545	1.2397	0.0148	1.3024	1.2938	0.0086	1.3750
1 1/2	8	1.3795	1.3647	0.0148	1.4278	1.4188	0.0090	1.5000
1 5/8	8	1.5045	1.4897	0.0148	1.5531	1.5438	0.0093	1.6250
1 3/4	8	1.6295	1.6147	0.0148	1.6785	1.6688	0.0097	1.7500
1 7/8	8	1.7545	1.7397	0.0148	1.8038	1.7938	0.0100	1.8750
2	8	1.8795	1.8647	0.0148	1.9292	1.9188	0.0104	2.0000
2 1/8	8	2.0045	1.9897	0.0148	2.0545	2.0438	0.0107	2.1250
2 1/4	8	2.1295	2.1147	0.0148	2.1798	2.1688	0.0110	2.2500
2 1/2	8	2.3795	2.3647	0.0148	2.4305	2.4188	0.0117	2.5000
2 3/4	8	2.6295	2.6147	0.0148	2.6812	2.6688	0.0124	2.7500
3	8	2.8795	2.8647	0.0148	2.9318	2.9188	0.0130	3.0000
3 1/4	8	3.1295	3.1147	0.0148	3.1820	3.1688	0.0132	3.2500
3 1/2	8	3.3795	3.3647	0.0148	3.4321	3.4188	0.0133	3.5000

All dimensions are given in inches.
The American National Form of thread shall be used.
[1] Pitch diameter tolerances include errors of lead and angle.

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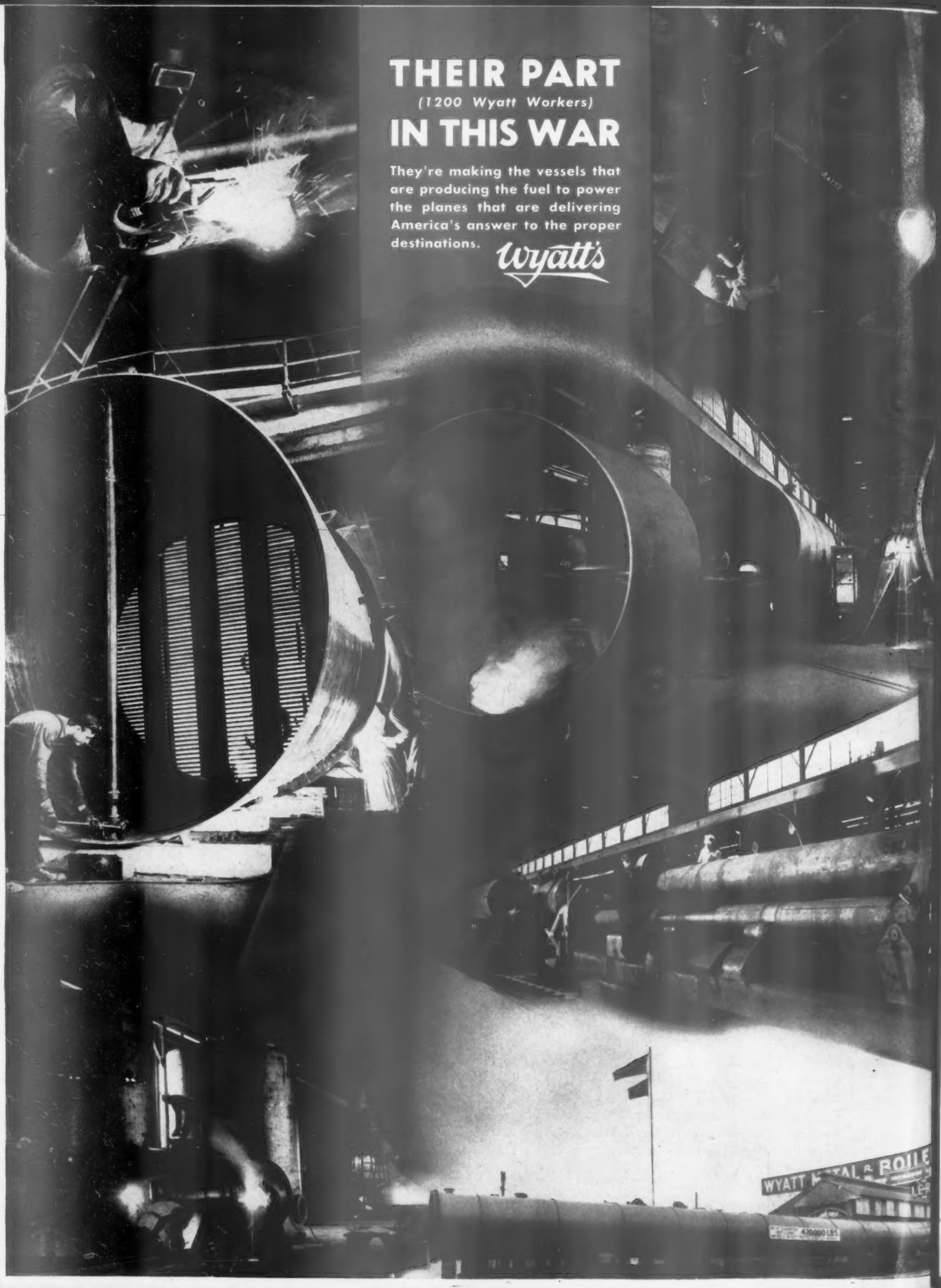
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